Experiment No: 01

Title: Creating and Optimizing UV Maps for a Basic 3D Object

Aim

To create UV maps for simple 3D objects and optimize them using proper seam placement and unwrapping tools in Blender.

Software Required

- Blender (Version 5.0.1)

Theory

UV Mapping is the process of projecting a 2D texture onto a 3D model surface.

- **U and V coordinates** represent the horizontal and vertical axes of a 2D texture.
- A **UV Map** defines how texture pixels correspond to the 3D surface.
- **Seams** are marked edges that define how a 3D model is "cut" for flattening.
- Proper seam placement reduces distortion and improves texture quality.

Common Unwrapping Methods:

- Unwrap
- Smart UV Project
- Cube Projection
- Sphere Projection

UV Optimization ensures:

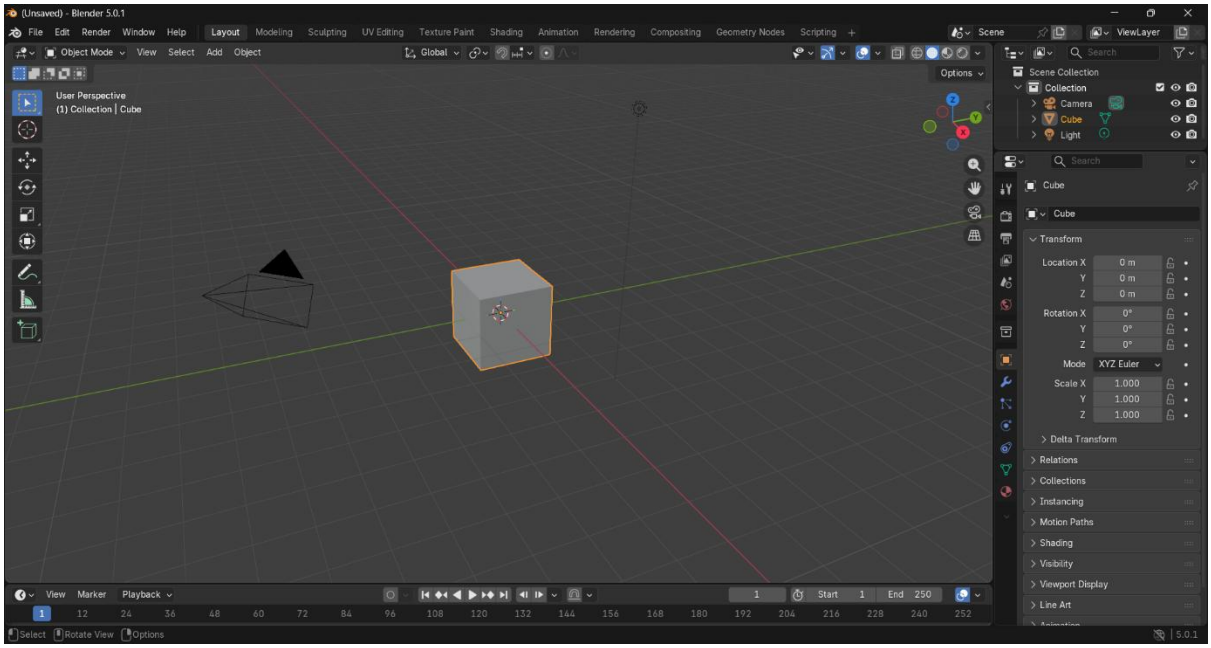
- Minimum stretching
- Efficient texture space usage
- Uniform texel density

Procedure

Part A: UV Mapping a Cube

1. Open Blender → Select **General** workspace.
2. Delete default cube (if required).
3. Add a new Cube → Shift + A → Mesh → Cube.
4. Press Tab to enter **Edit Mode**.

5. Switch to **Edge Select Mode**.

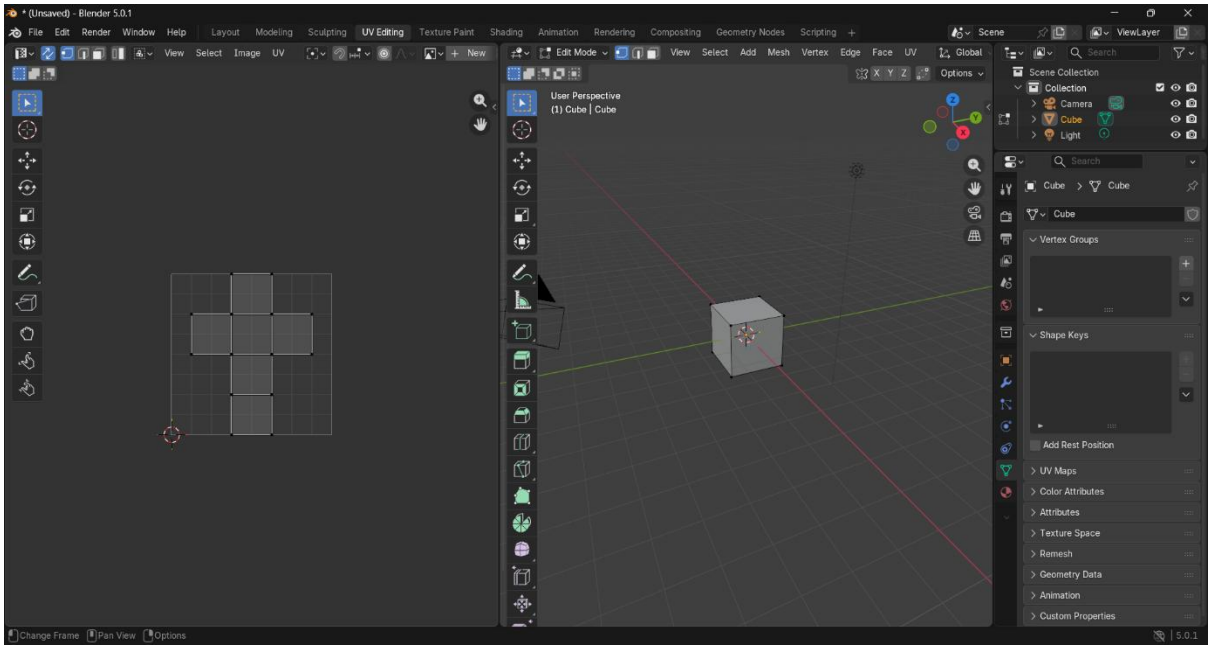


Marking Seams:

6. Select one vertical edge.
7. Select edges around the top face.
8. Right-click → **Mark Seam**.

Unwrapping:

9. Press A to select all faces.
10. Press U → Unwrap.
11. Open **UV Editor** to view layout.

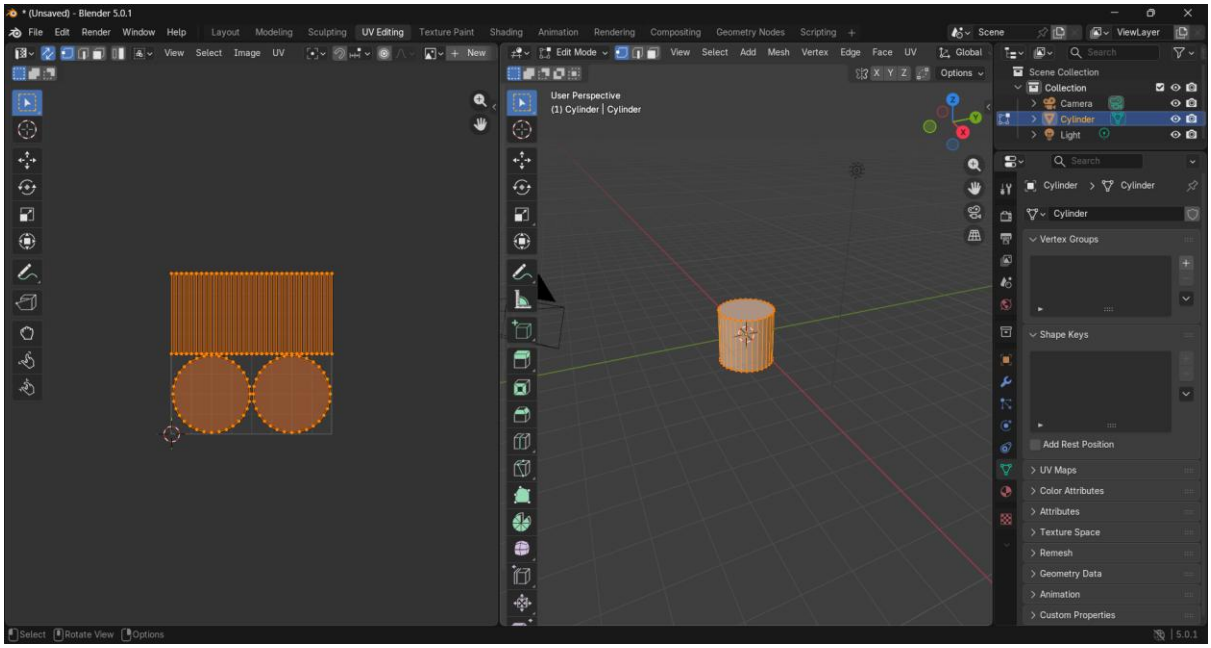


Optimization:

12. Press A in UV Editor.
13. Use **UV → Pack Islands**.
14. Adjust using S (Scale), R (Rotate), G (Move).

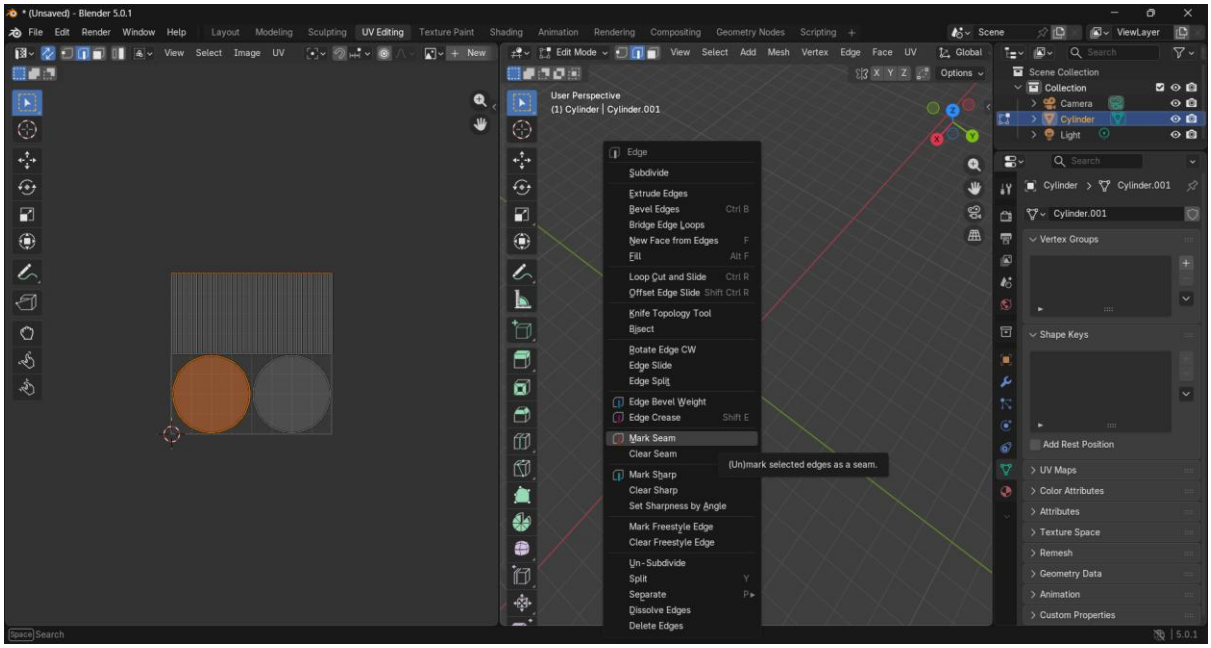
Part B: UV Mapping a Cylinder

1. Add Cylinder → Shift + A → Mesh → Cylinder.
2. Enter Edit Mode.



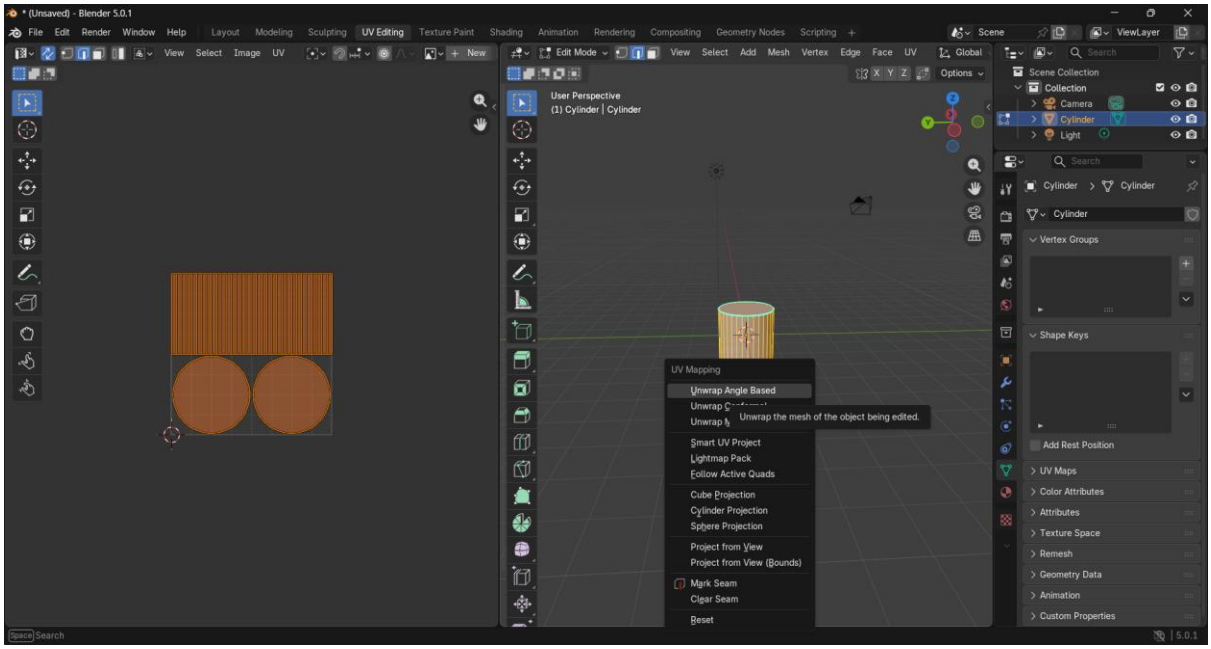
Mark Seams:

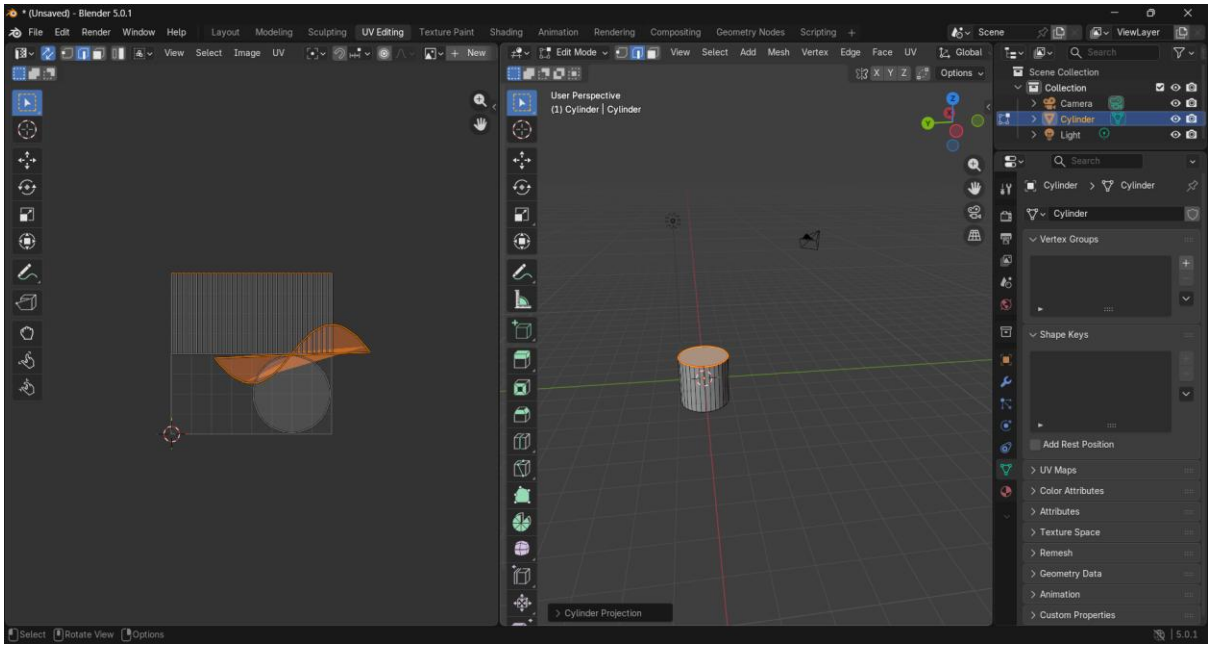
3. Select one vertical edge loop → Mark Seam.
4. Select top and bottom circular loops → Mark Seam.



Unwrap:

5. Select all faces → U → Unwrap.





Observation:

- Side surface becomes rectangular.
- Top and bottom faces become circular UV islands.

Part C: UV Mapping a ICO Sphere

1. Add ICO Sphere → Shift + A → Mesh → UV Sphere.
2. Enter Edit Mode.

Mark Seams:

3. Select one vertical edge loop → Mark Seam.
4. Select one horizontal edge loop → Mark Seam.

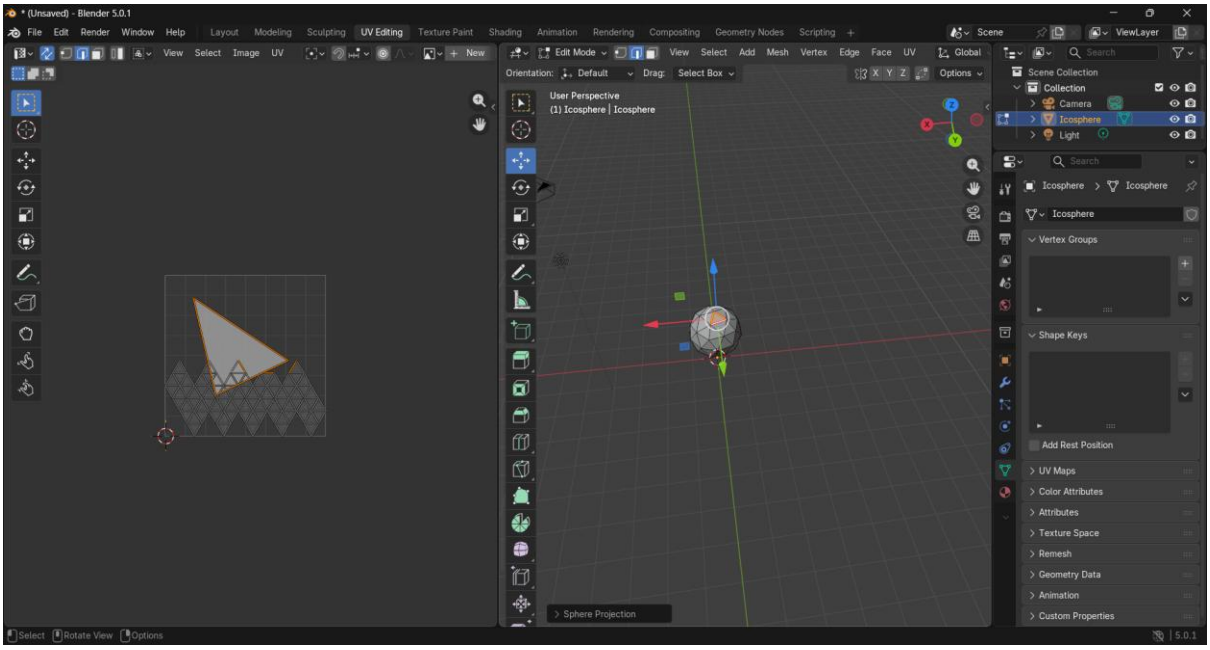
Unwrap:

5. Select all faces → U → Unwrap.

Compare Methods:

6. Try U → Smart UV Project.
7. Try U → Sphere Projection.

8. Compare UV layouts in



UV Editor.

Precautions

- Always mark seams logically like unfolding real-world objects.
- Avoid excessive seams to prevent visible texture breaks.
- Check distortion using a UV grid texture.
- Maintain uniform scaling for consistent texture resolution.

Conclusion

The experiment demonstrated the process of creating and optimizing UV maps for basic 3D models in Blender. Proper seam placement and UV packing significantly improve texture quality and efficiency.