3-D Graphics

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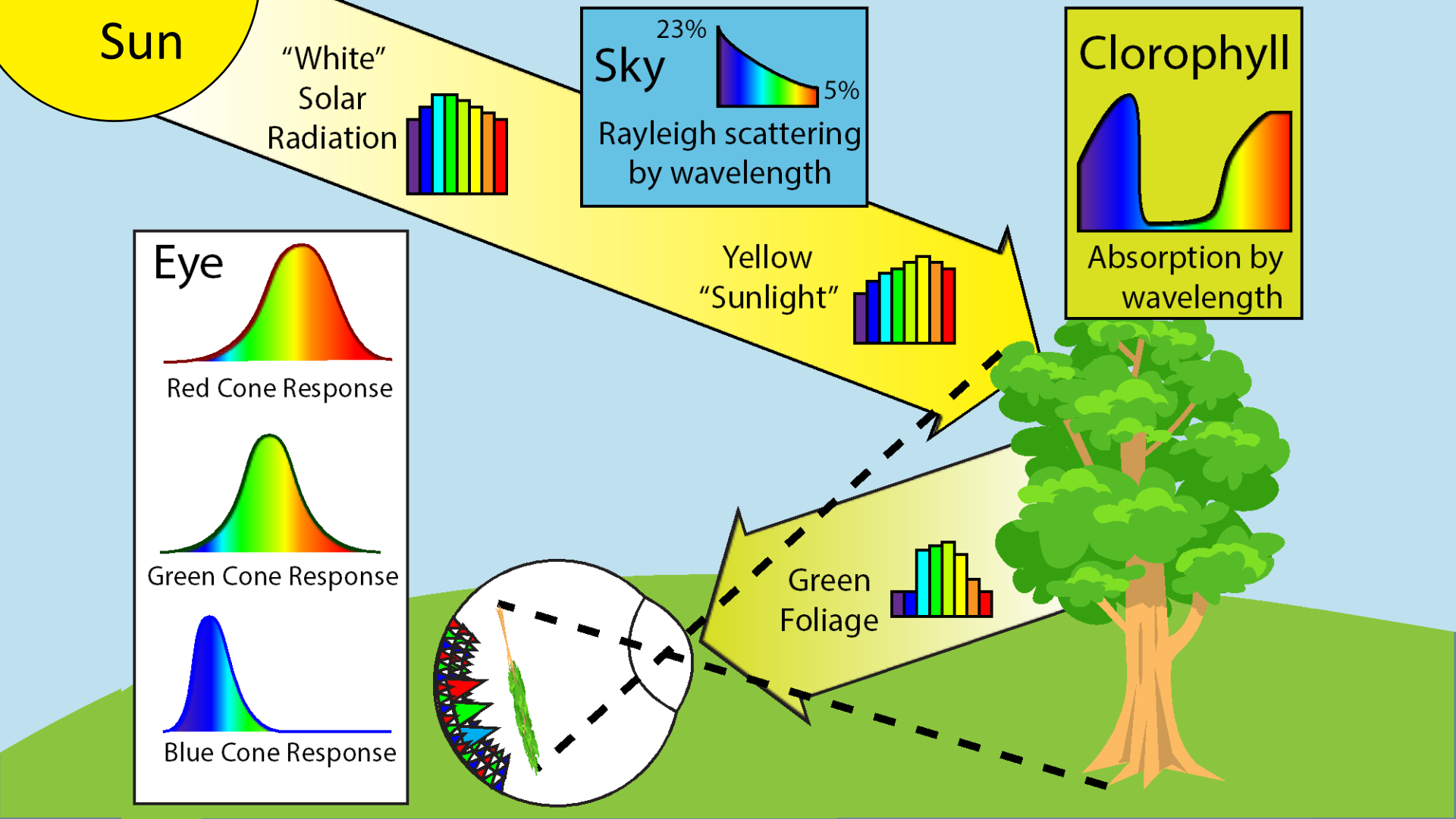
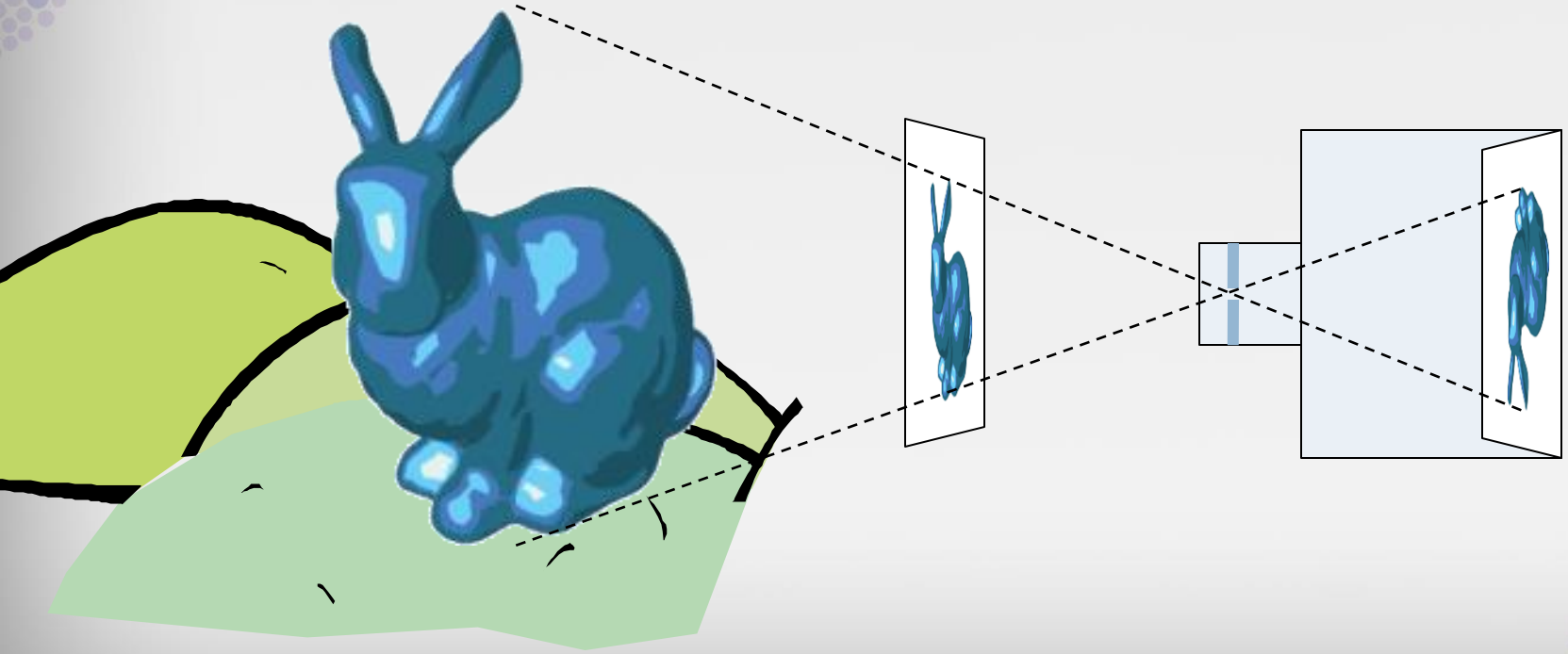
What Will We Learn?

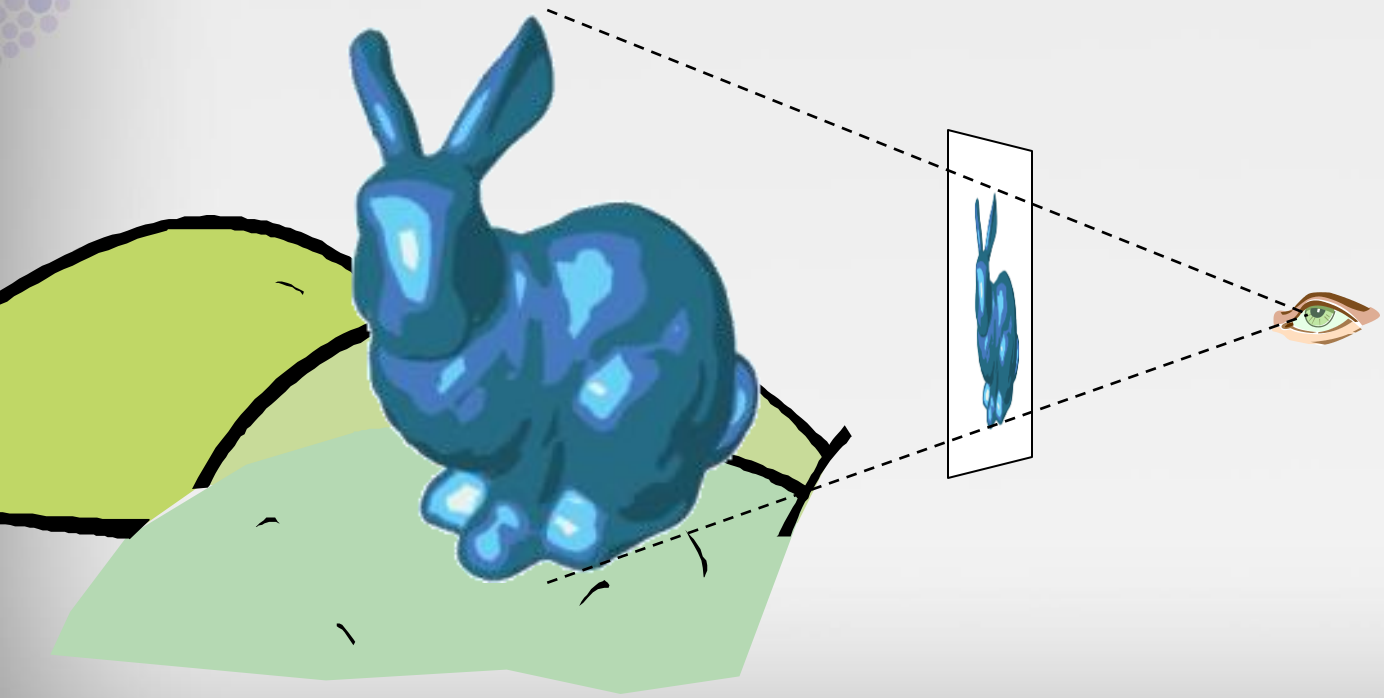
- Why is the sky blue?
- Why is the sun yellow?
- Why is the grass green?
- How does 3-D graphics work?


Sun
"White"
Solar
Radiation
Sky
23%
5%
Rayleigh scattering
by wavelength
Clorophyll
Absorption by
wavelength
Yellow
"Sunlight"
Eye
Red Cone Response
Green Cone Response
Blue Cone Response
Green
Foliage

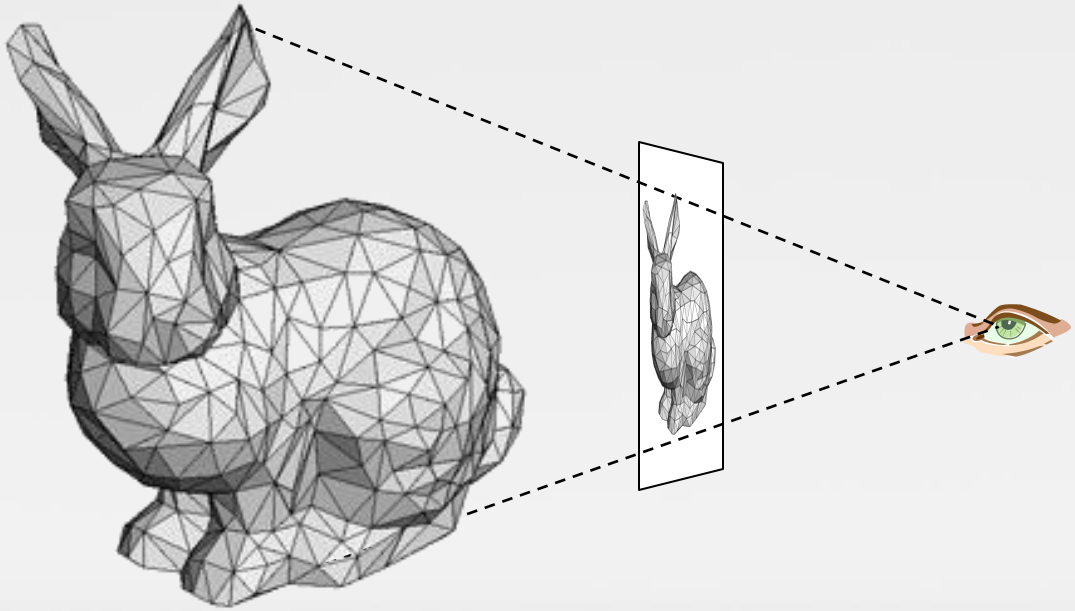
The Camera



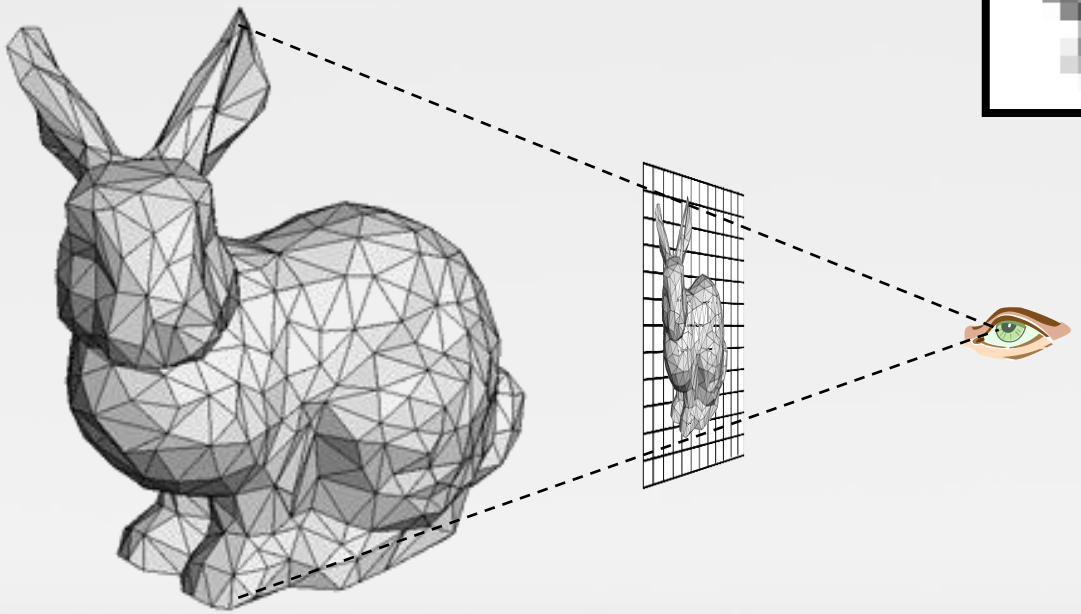
The Image Plane

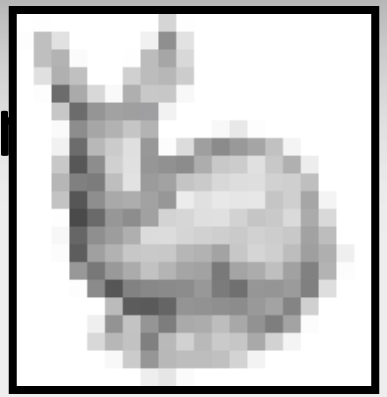


Polygonal Models

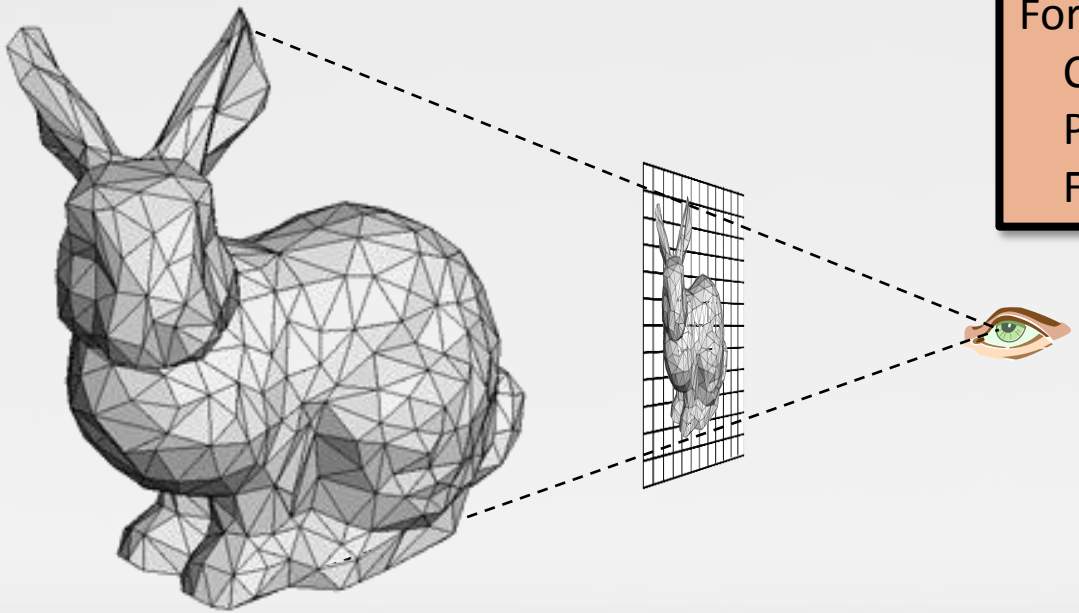


Pixel Discretizatio



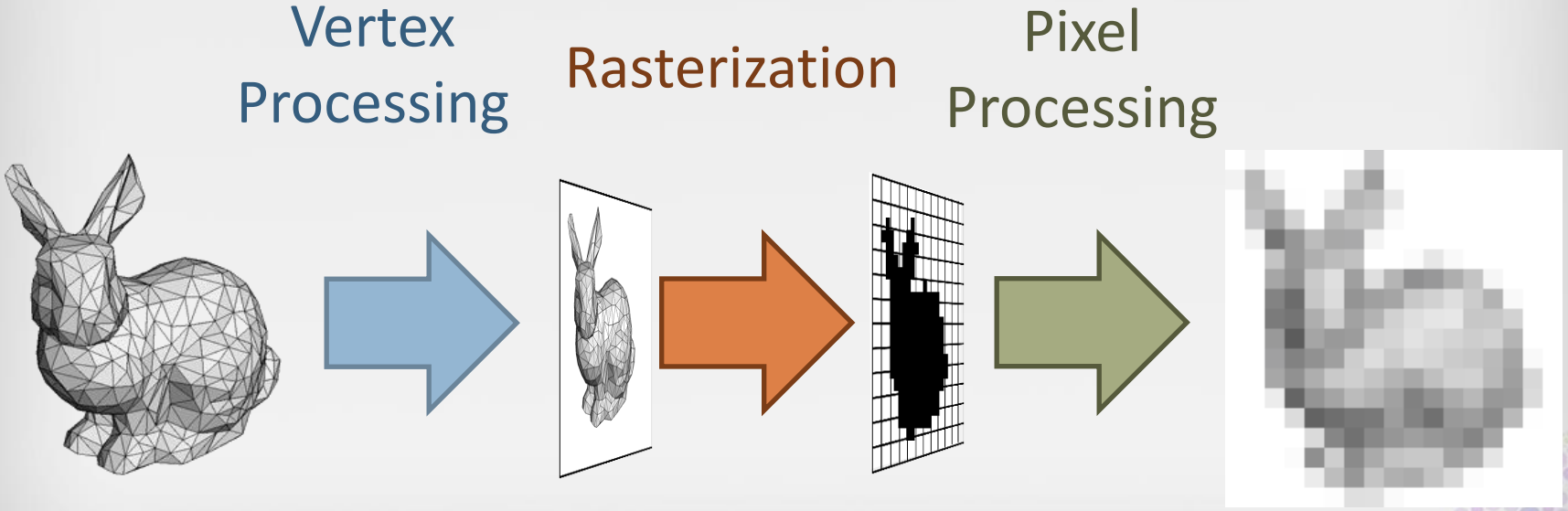


Raster Rendering



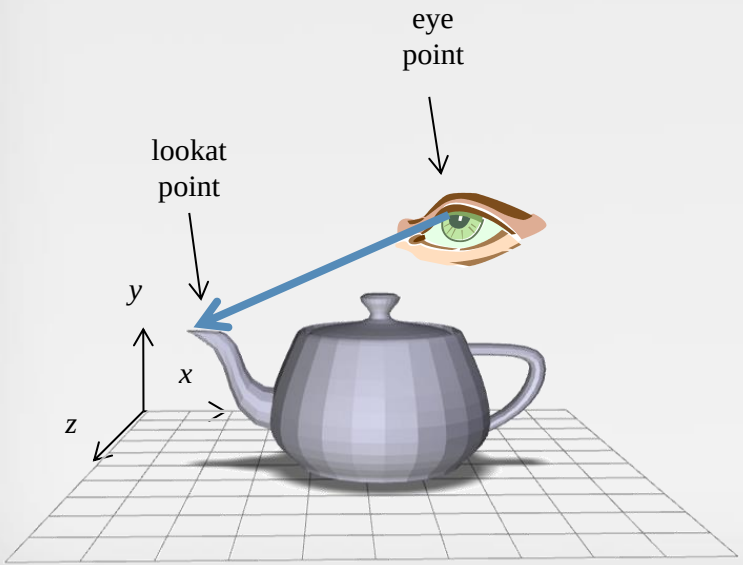
For each primitive:
- Compute illumination
- Project to image plane
- Fill in pixels

3-D Graphics Pipeline

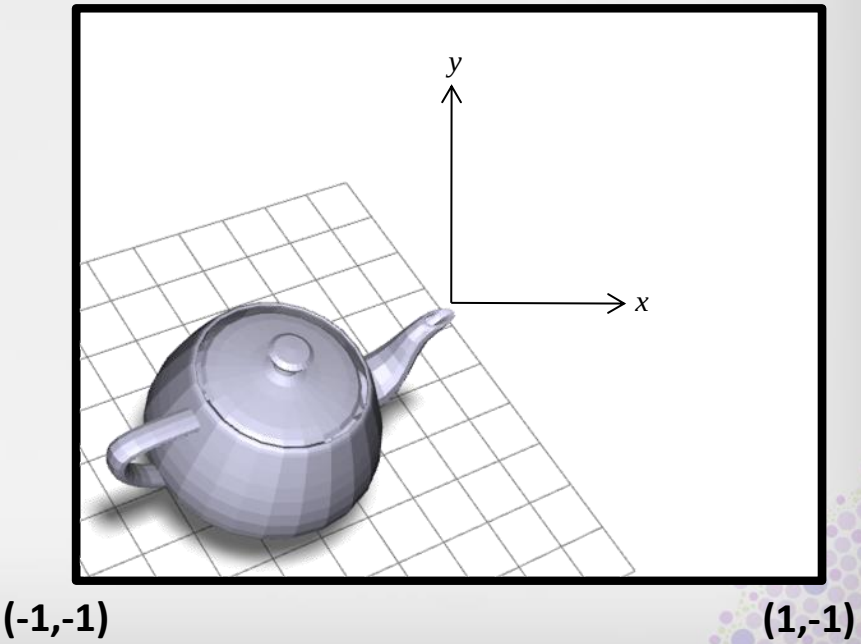


Viewing a 3-D Scene

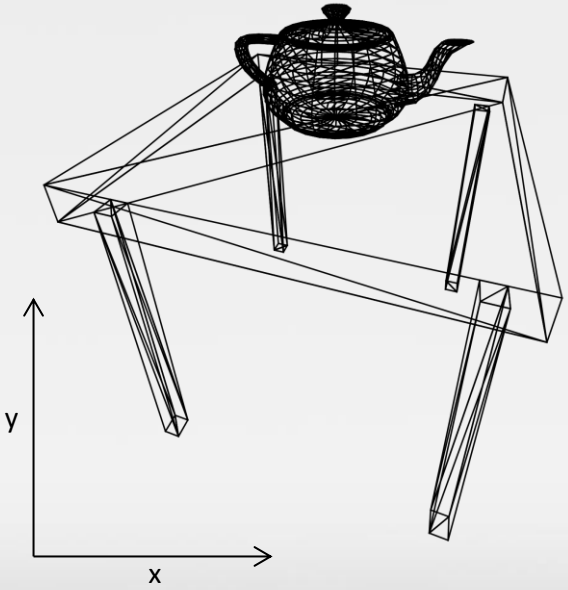
World Coordinates

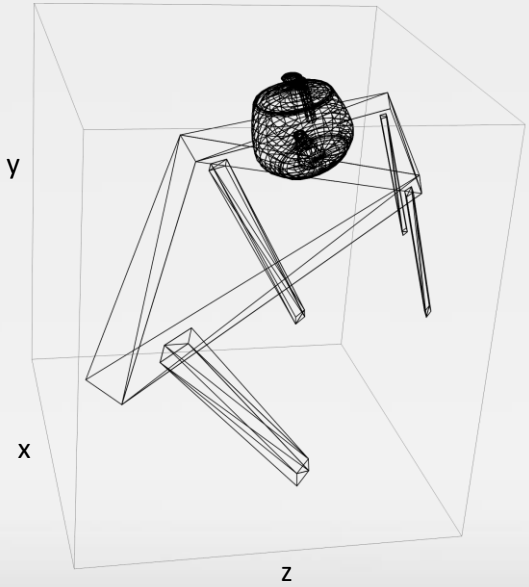


Canvas Coordinates



Perspective Distortion





What Have We Learned?

- 3-D graphics scenes consist mostly of triangle meshes
- We specify a view with an eye point, a lookat point and an up direction
- In graphics, perspective really does change object sizes
- Vertex processing projects triangles onto image plane
- Rasterization converts shapes into pixels
- Pixel processing determines colors (e.g. shading) of pixels