CSC 240
Computer Graphics

Fall 2015
Smith College

Outline: 10/28

- Mathematics of Lighting
- Lighting overview
- Lighting lab: phases of the moon

White background slides from Eitan Mendelowitz

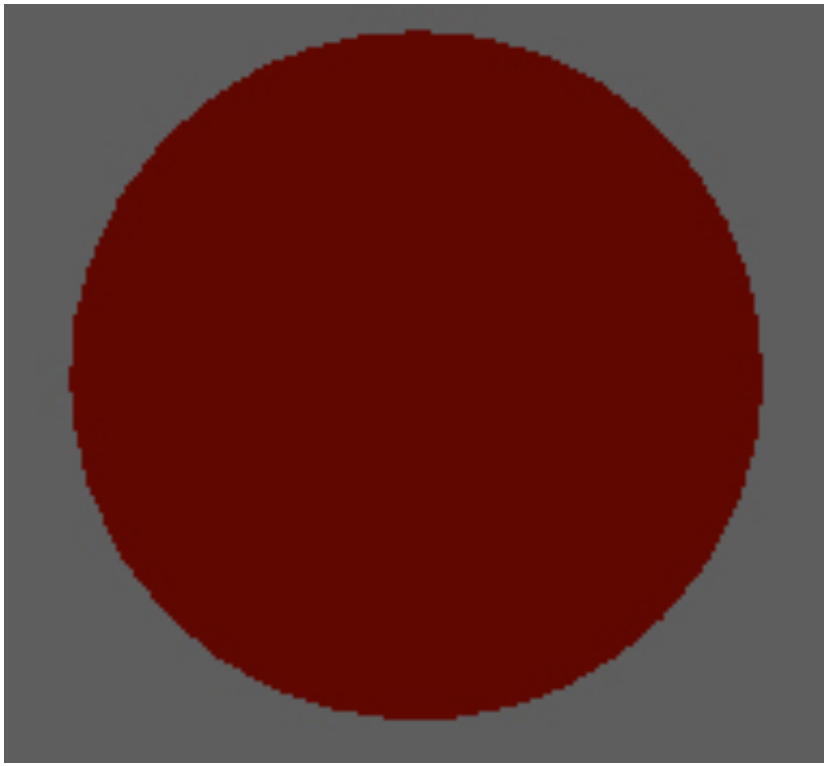
Types of Lighting

- Ambient
- Diffuse
- Specular
- Emitted

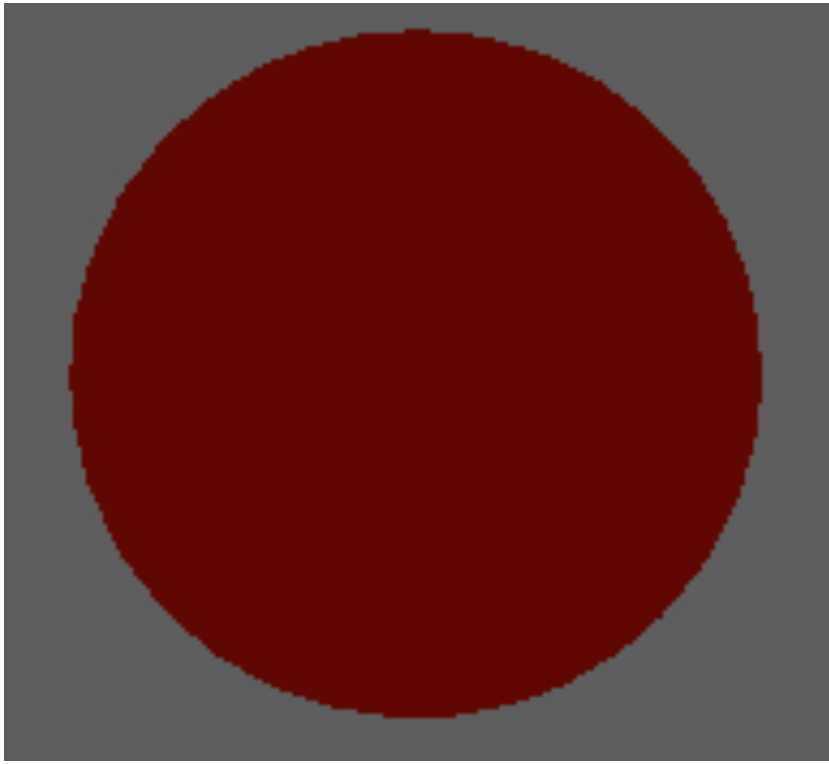
Reading: OpenGL Red Book
Chapter 5: “Lighting”:
http://www.glprogramming.com/red/chapter05.html

Ambient

- General Light levels
- Constant



Ambient



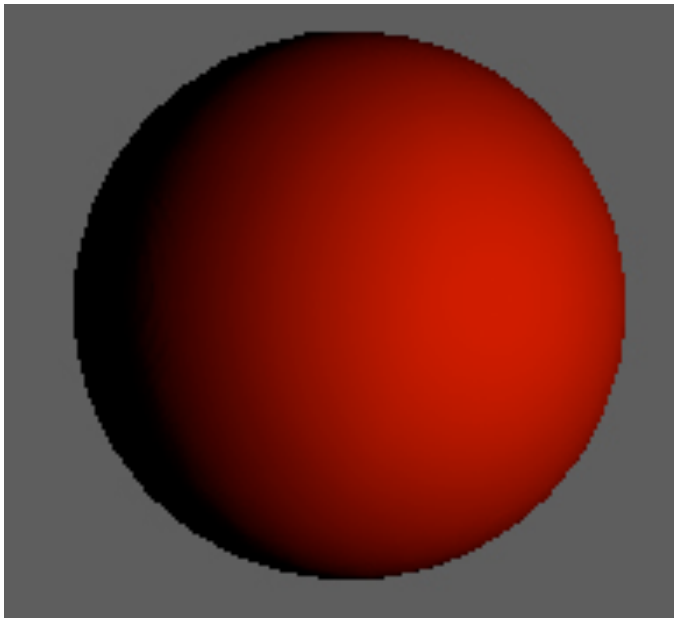
- pixel color =
  material color * ambient light color

Ambient Light

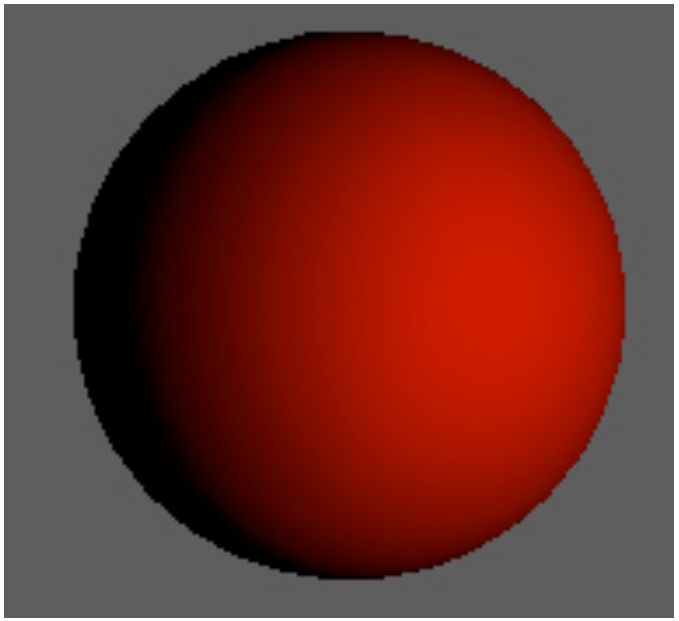
- Ambient light doesn’t make shapes look 3D!
- So scattered you can’t tell it’s original direction

Diffuse

- Light from a source
- scattered by an object



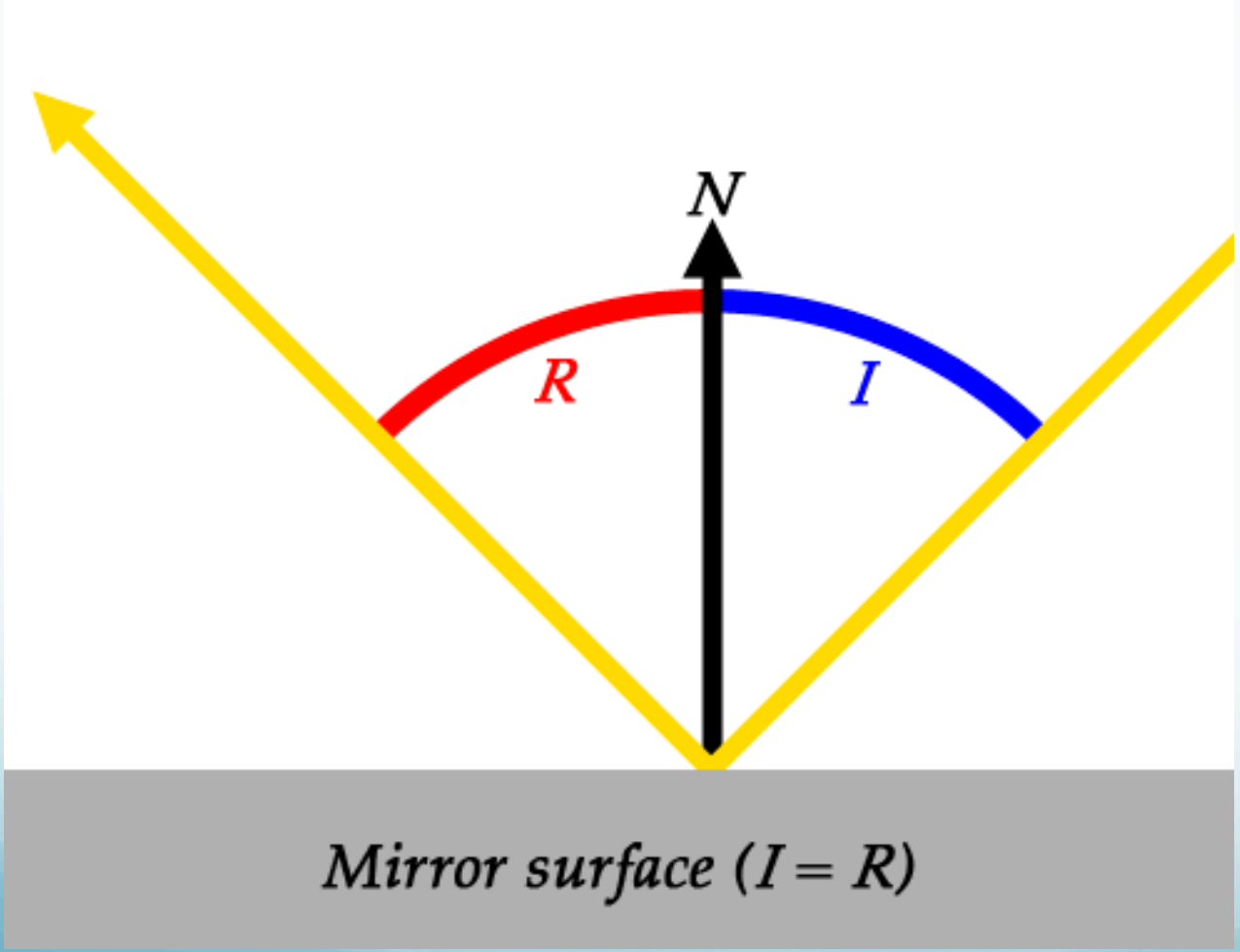
Diffuse



- pixel color =
  material color*lightColor*(lightDirection•normal)

- What about non-diffuse (shiny, specular) surfaces?

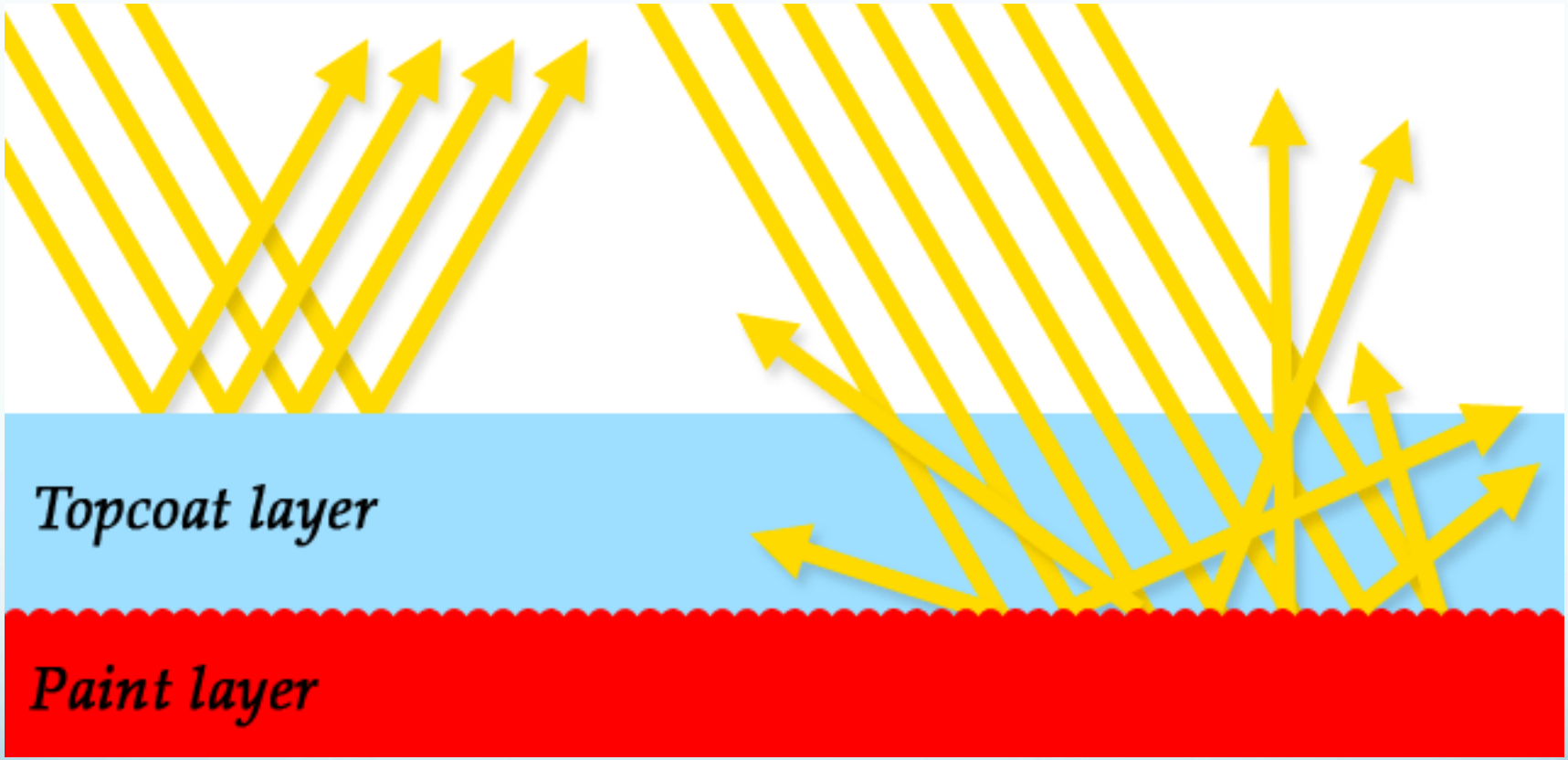
Specular Light



- Mirror-like
- “shiny”

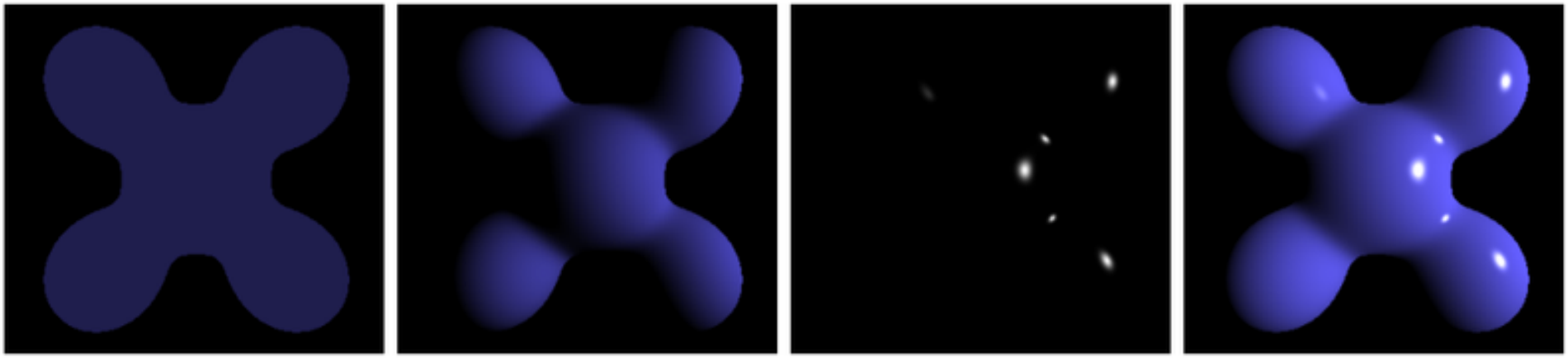
Credit: Tom Dalling

Specular and Diffuse lighting



Credit: Tom Dalling

Adding up lighting types



Ambient + Diffuse + Specular = Phong Reflection

Credit: Brad Smith

Add it up

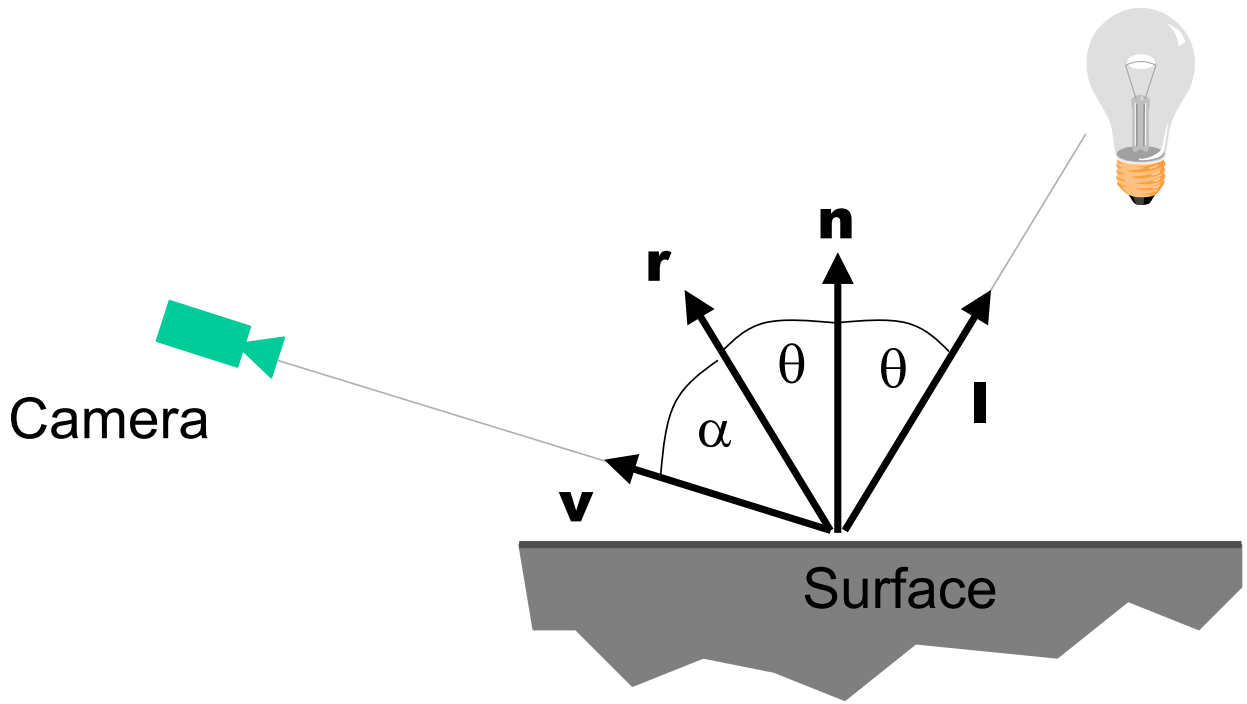
- pixel color = ambient + diffuse + specular

Phong Model

- no basis in physics!
- most common model
  - (but there are many others)

Phong Model

- Specular Light reflected depends on angle between ideal reflection and the angle to the eye.



Emitted

- Light source is “inside” object
- Looks like it’s glowing