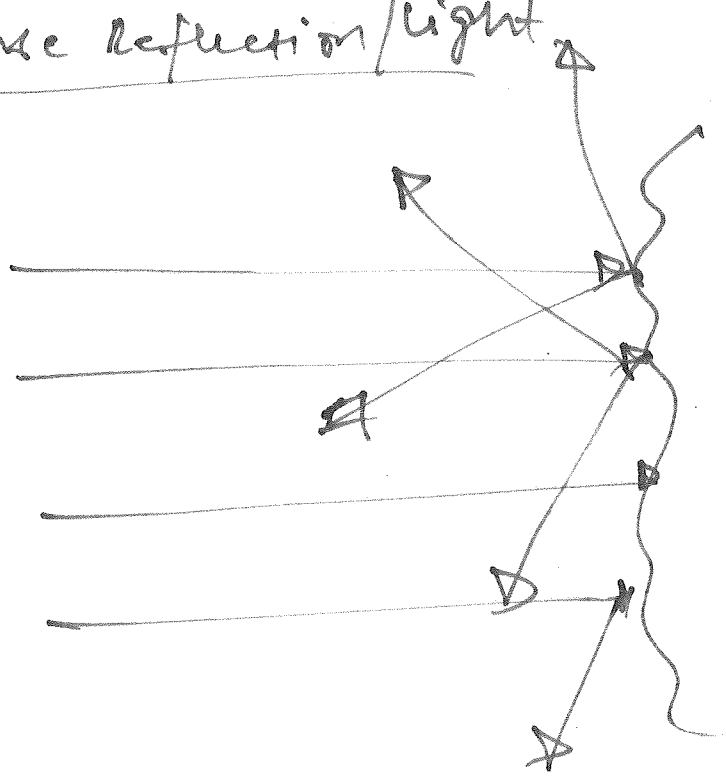
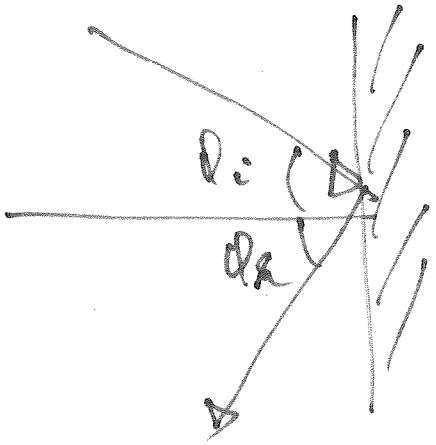
Diffuse Reflection / Light



- incident ray is reflected at all angles
- most important and most common
- final decider of color

Specular Reflection / Light



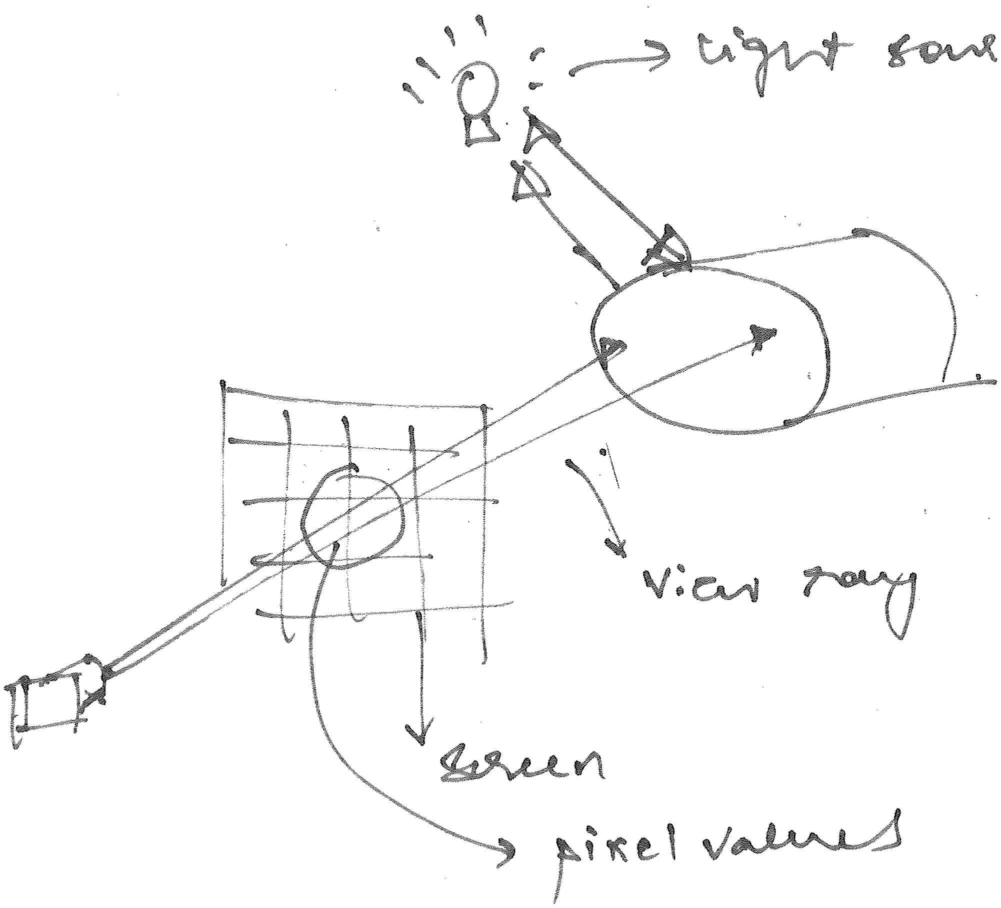
Typically $\theta_i \simeq \theta_r$

↳ perfect mirror like reflection!

Ambient ⟹ No direct lighting.

Σ of light incoming to surface (diffuse + ambient + specular) + material property of surface (color + texture + reflection + transparency) = Final pixel value!

(?? Anything missing?)



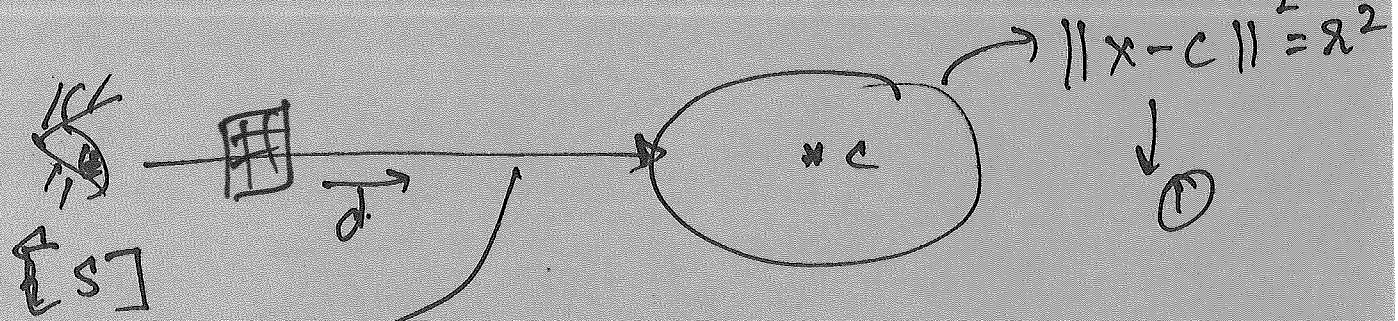
- for each pixel in image
  - ray from eye thro' pixel
  - for every object in scene
    - If ray intersects object
      → If parameter < Eq
      then ~~t = par~~ revise parameter
      else parameter = ∞
  - If no object
    - pixel value == Background.

Else

— shoot light ray to object

— compute shading

— fill pixel based on shading function.



(2) — $x = s + t\vec{d}$ [parametric form]

$t \rightarrow$ is 'parameter'

subst (2) in (1)

$$\| s + t\vec{d} - c \|^2 = R^2$$

if $v = s - c$

then,

$$\| v + t\vec{d} \|^2 = R^2$$

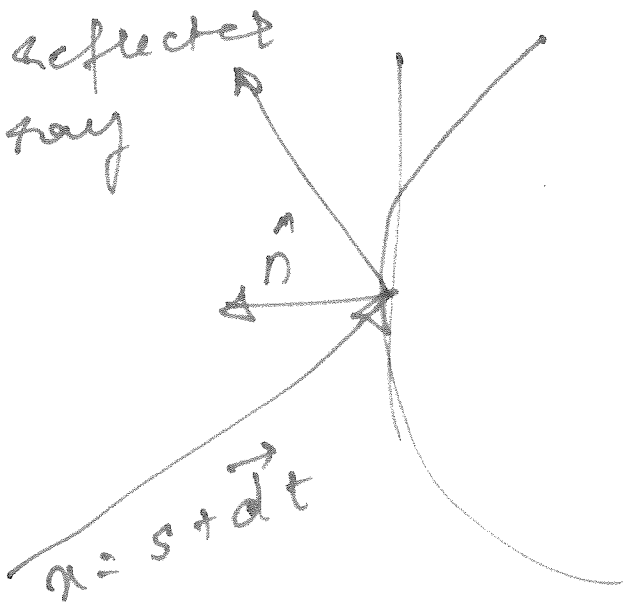
This is in $(a+b)^2$ format, expand taken x.

$$t^2 + (2v \cdot d)t + (v^2 - R^2) = 0$$

Quadratic Eqns, can solve.

→ what do different roots mean here?

→ If we know t, and normal $\hat{n}$ to the point on sphere, then,



[Dot pdt to get that!]

- Ambient light does nothing for shading
- Diffuse light has moderate effect on shading
- Specular & Spot lights have the "most" effect.

→ Distance fall off

→ Surfaces which have "right" depth values, or are factored from light must be "darker"

→ Linear or quadratic (almost real life) functions

Gouraud shading

vertex normal = Mean (incident surface polygon normals)

→ problem? value dependent on # of polygons on a surface!!

→ what about interior?

Phong Shading

→ works off phong illumination model.

→ Take all vertex normals and interpolate linearly across the surface.

→ Computationally more expensive!!