Common Types of Light Sources

* Ambient Light: no identifiable source or direction
* Point source: given only by point
* Distant light: give only by direction
* Spotlight: from source in direction
  + Cut-off angle defines a cone of light
  + Attenuation function (brighter in center)
* Light source described by a luminance
  + Each color is described separately
  + I = [Ir Ig Ib]T (I for intensity)
  + Sometimes calculate generically (applies to r, g, b)

Ambient Light

* Intensity is the same at all points
* This light does not have a direction (or… it is the same in all directions)

Point source

* Given by a point p0
* Light emitted from that point equally in all directions
* Intensity decreases with square of distance
* One limitation of point sources
  + Shading and shadows inaccurate
  + Example: penumbra (partial “soft” shadow)

Distant Light Source

* Given by a vector v
* Intensity does not vary with distance (all distances are the same… infinite!)

Spotlight

* Most complex light source
* Light still emanates form point
* Cut-off by cone determined by angle theta

Spotlight Attenuation

* Spotlight is brightest along Is
* Vector v with angle phi from p to point on surface
* Intensity determined by cos phi
* Corresponds to projection of v onto Is
* Spotlight exponent e determines rate

Surface Reflection

* When light hits an opaque surface some is absorbed, the rest is reflected
* The reflected light is what we see
* Reflection is not simple and varies with material
  + The surface’s micro structure define the details of reflection
  + Variations produce anything from bright specular reflection (mirrors) to dull matte finish (chalk)

Resource:

Carnegie Mellon University class notes

http://graphics.cs.cmu.edu/nsp/course/15-462/Spring04/slides/07-lighting.pdf