

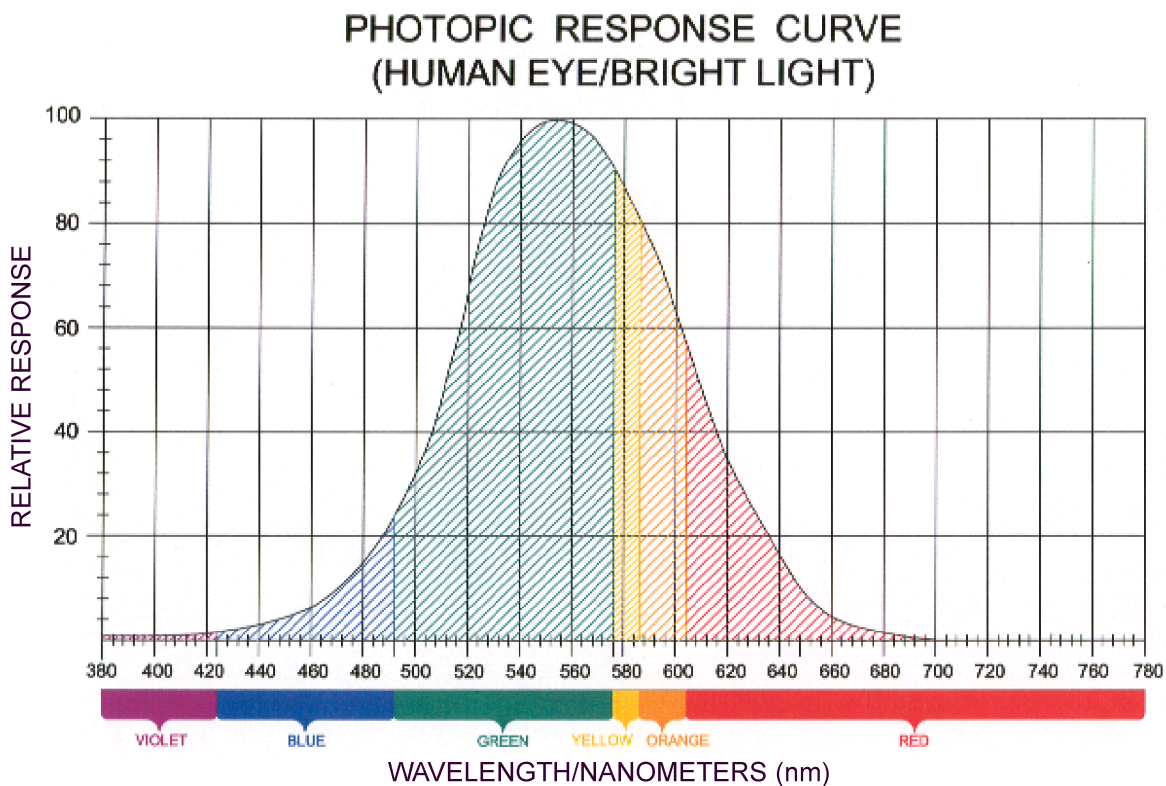
Visible Light Spectrum and the Human Eye Luminance Response (Photopic and Scotopic Curves)

The human eye has a varied response to spectral energy depending on the luminance level. The two distinctive response curves of the human eye are the photopic, for bright light, and scotopic, for low light levels. The photopic eye response curve for high levels of luminance is centered at 555nm for green/yellow light. The scotopic eye response curve for low luminance levels is shifted toward the blue region and is centered about 40nm below the photopic curve peak near 515nm.

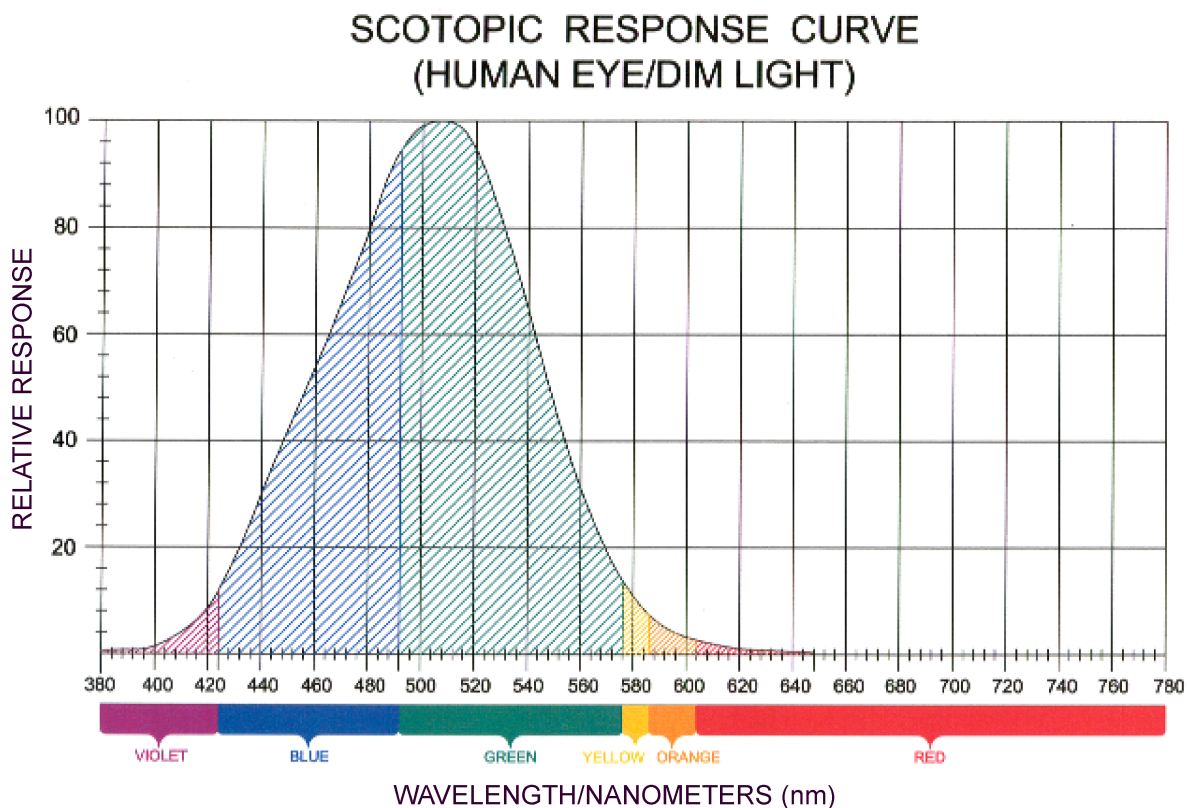
The upper limits of the scotopic region would be objects viewed on a clear night with a full moon. The light reflected from pages being read under candle light would be in the photopic region. But, as you move further away from the flame the light on surfaces in a room would be transitioning into the scotopic region. The luminance level transition point is about 1 Cd/m². During scotopic vision, the retinal rods are active in the dark adapted eye. With low light levels the eyes' cones used for color vision are not stimulated.

The portion of the electromagnetic spectrum for eye response is generally considered to be from 400nm to about 700nm. The violet/blue light shorer wavelength limit at 400nm is slightly above the ultraviolet "A" region where 365nm black light energy is located. The longer wavelength red light limit is located slightly below the near infrared region. The invisible near infrared region around 900nm is typically used for electronic remote control applications. The spectral energy graphs are limited in their expression of color for mixed wavelengths. A chromaticity diagram is used to produce a representation of colors resulting from mixed wavelengths of light.

Graph #1 shows the eyes' photopic response in relation to the light region from 380nm to 780nm, and graph #2 indicates the response for scotopic response.



Graph #1



Graph #2