

IENG505

Homework Assignment-1

Submission Date: 11/06/2014

Problem 1.

A work area has a reflectivity of 60 percent, based on the color combination of the workstation and the immediate environment. The seeing task of this assembly work can be classified as difficult. What would be your recommended illumination if the worker is 43 years old and the speed/accuracy is critical?

The category of task is: E → [500, 750, 1000] luxes.

60 % reflectivity → the weight index= 0.

Critical speed and accuracy → the weight index= +1.

43 years age → the weight index= 0.

Therefore, the sum of all weight indexes are: 0 +1 + 0= 1. Therefore, the illumination should be at least 750 luxes.

Problem 2.

What is the illuminance on a surface 1.5 feet from a 2-candela source of light?

Illuminance= $2/(1.5)^2 = 0.89$ foot-candelas.

Problem 3.

What is the luminance of a surface having a 50 percent reflectance and 4 foot-candle illumination?

$L = 4 \times 0.5 = 2$ foot-candelas.

Problem 4.

What is the contrast created by black text (reflectance=10 percent) on white paper (reflectance=90 percent)?

Contrast ratio = $(L_{90\%} - L_{10\%}) / L_{90\%}$

$$= [(\text{Illumination} \times 0.9) - (\text{Illumination} \times 0.1)] / (\text{Illumination} \times 0.9) = (0.9 - 0.1) / 0.9 = 0.89$$