

PHYSICAL WORK ENVIRONMENT

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LECTURE OUTLINE

- Visual environment
 - Physics of light
 - Visibility
 - Lighting system



VISUAL ENVIRONMENT

VISUAL ENVIRONMENT AND LIGHTING

- About 80% of the information input to the human brain comes from visual stimuli
- Topics:
 - The physics of light
 - Visibility
 - Lighting systems

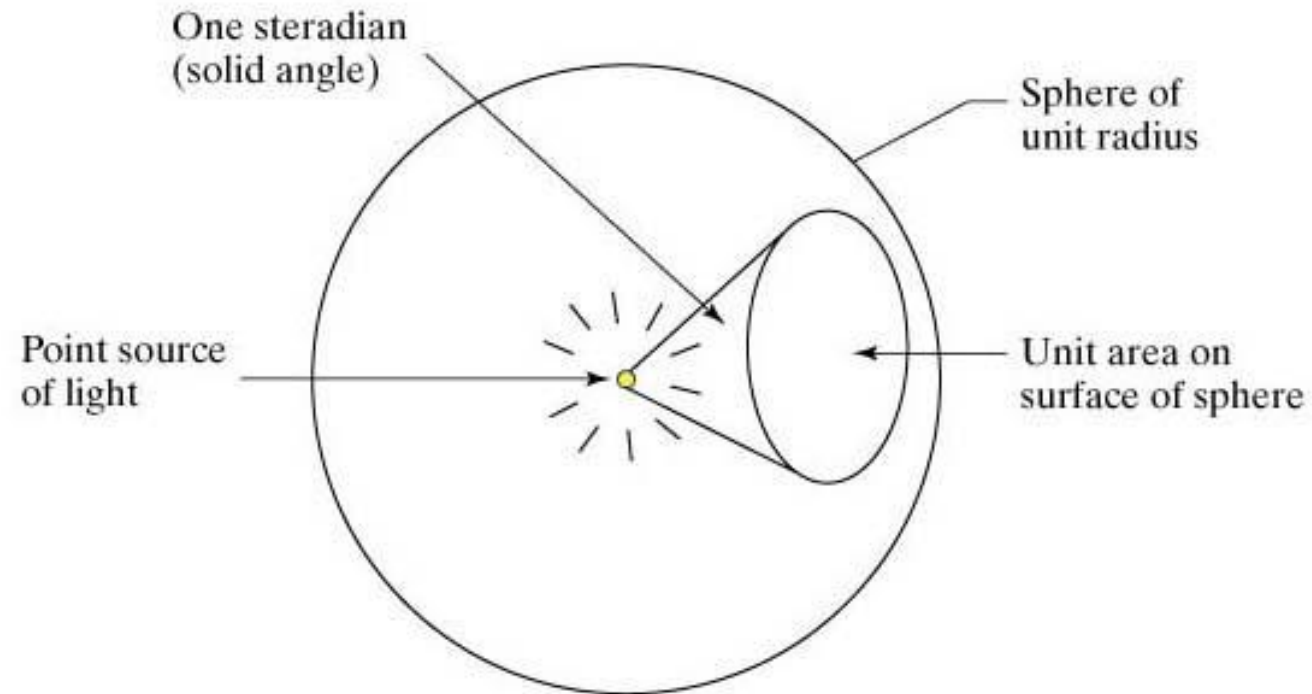


PHYSICS OF LIGHT

THE PHYSICS OF LIGHT

- Luminous flux - rate at which light energy is emitted in all directions from a light source
 - It is the power of the light source
 - Units: lumen (lm)
- Luminous intensity - luminous flux emitted in a given direction
 - Units: candela (cd)

POINT SOURCE OF LIGHT



THE PHYSICS OF LIGHT

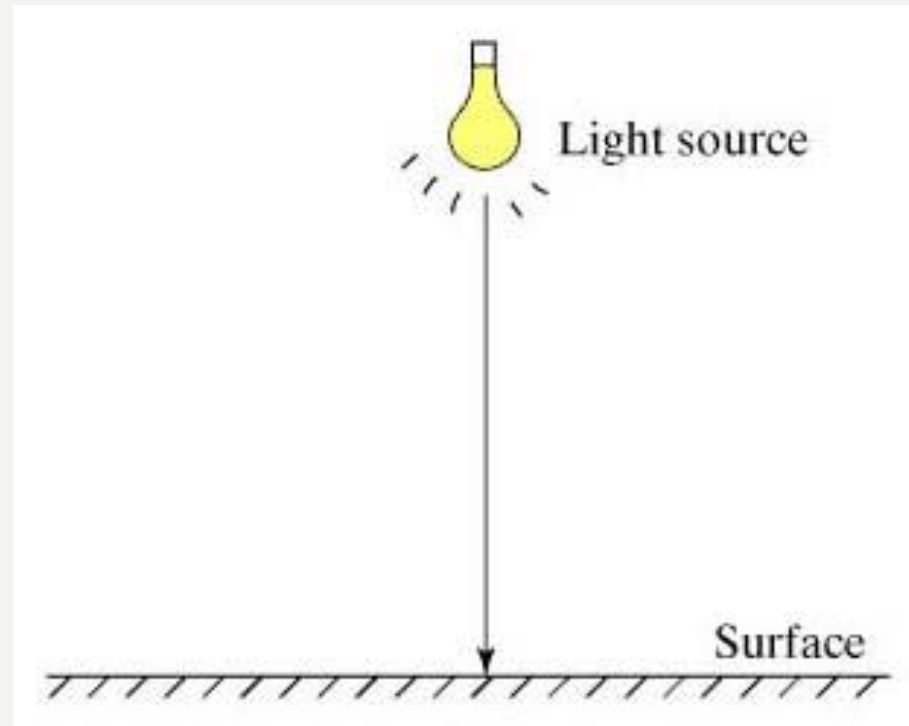
- Illuminance - luminous flux shining per unit area on a surface
 - Units: lux (lx) = 1 lumen per sq meter
- Luminance - amount of light reflected from a surface
 - Units: cd/sq m
 - Depends on
 - Illuminance - amount of light striking surface
 - Reflectance - depends on color and texture of surface

ANGLE OF INCIDENCE $\theta = 0$

Illuminance decreases with distance from light source

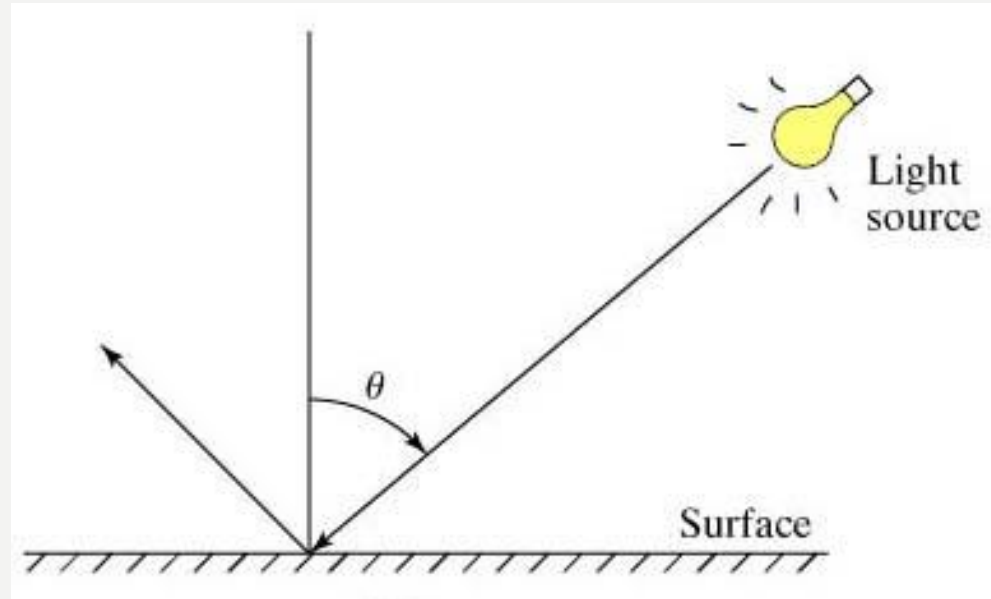
$$E = I / d^2$$

where E = illuminance, I = luminous intensity, and d = distance



INCIDENT LIGHT IS AT ANGLE θ

$$E = I \cos \theta / d^2$$

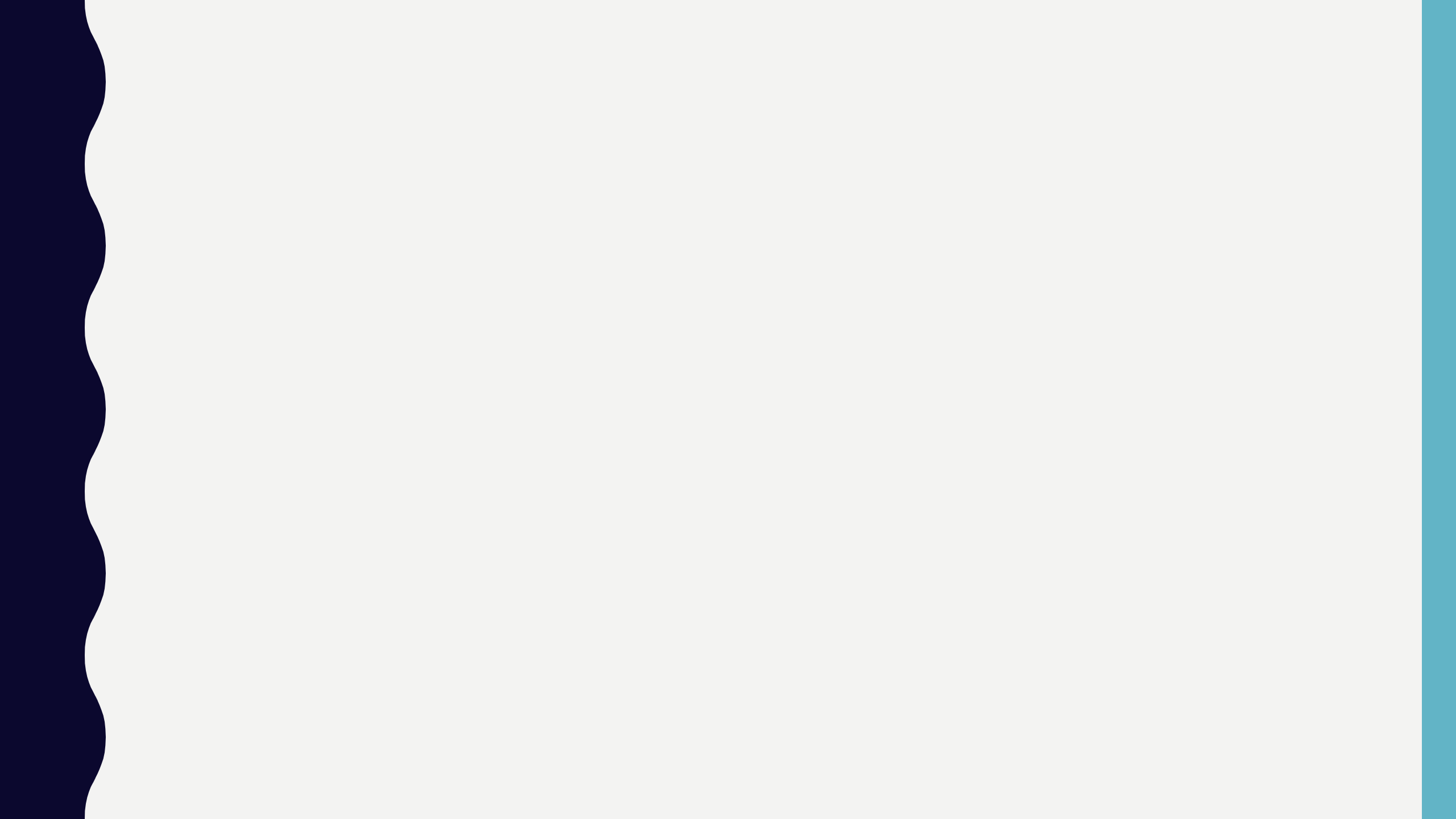


TYPICAL REFLECTANCE VALUES

<u>Object</u>	<u>Reflectance</u>
Mirrored glass	0.80 - 0.90
White matte paint	0.75 - 0.90
Aluminum paint	0.60 - 0.70
Black painted object	0.03 - 0.05
<u>Color</u>	<u>Reflectance</u>
White	0.85
Light green	0.65
Medium blue	0.35
Dark blue	0.08

A decorative graphic on the left side of the image consisting of three parallel, wavy vertical lines. The outermost line is white, the middle line is a light blue color, and the innermost line is white. These lines create a stylized, organic shape that resembles a splash or a stylized letter 'C'.

VISIBILITY



VISIBILITY

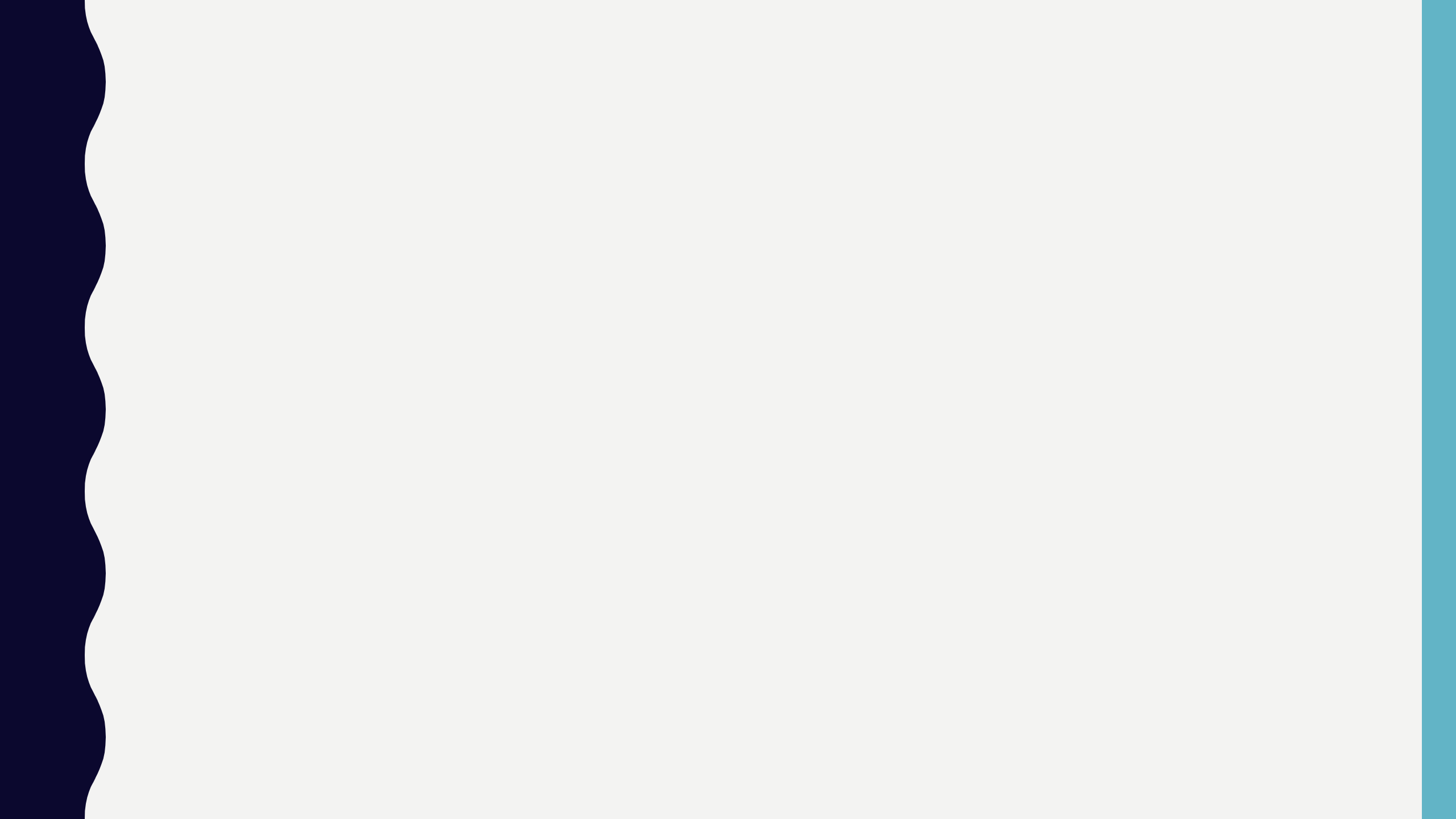
Relative possibility of being seen under prevailing conditions of light, distance, and related factors

- Most important factor = level of illumination
- Other factors:
 - Visual angle - angle subtended at the eye by the smallest distinguishable detail

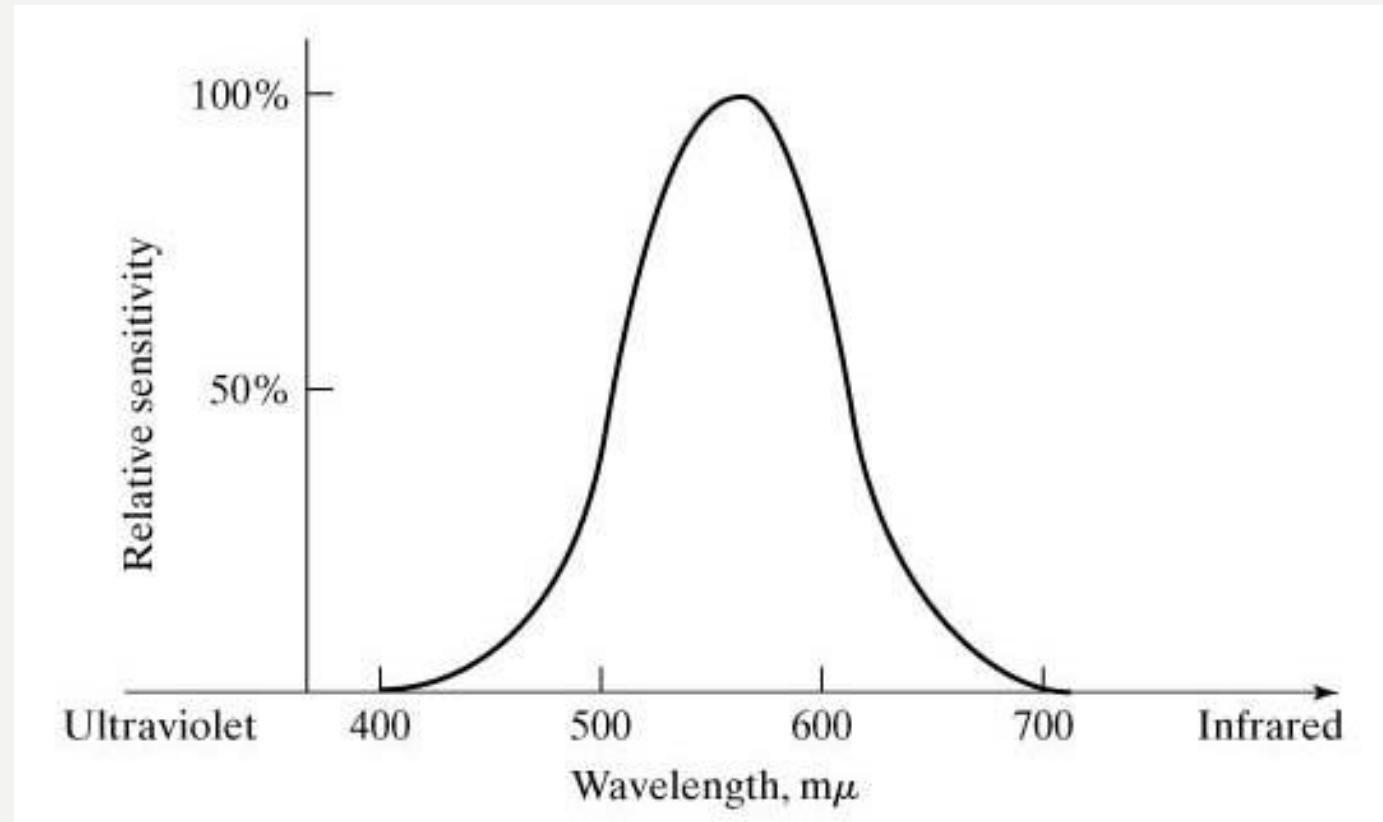
$$\alpha_v = 3438 \, h/d$$


where α_v is measured in arc minutes

- Brightness contrast - relative luminance between object and background
- Color



COLOR SENSITIVITY OF HUMAN EYE



The left side of the slide features a decorative graphic consisting of three parallel, wavy vertical lines. The outermost line is white, the middle line is a light blue color, and the innermost line is white. These lines create a stylized, organic shape that resembles a splash or a stylized letter 'L'.

LECTURE CLOSING

DID YOU KNOW.....?????

- Leonardo Da Vinci is credited with writing the first resume



IF YOU WERE.....?????

- If you were a interior designer, which type of luminaries would you choose to have for a mechanical workshop.....???



GRAFFITI





THANK YOU ...



PLEASE READ LIGHTING SYSTEM FROM
RECOMMENDED REFERENCE BOOKS FOR A
BETTER UNDERSTANDING OF NEXT
LECTURE