Important Light Measurement Formulas PDF

Formulas
Examples
with Units

List of 18
Important Light Measurement Formulas

1) Area affected by Light Incident Formula

Evaluate Formula

Formula

$$A = \frac{L_p}{H}$$

Example with Units

$$28.2051\,\text{m}^2 = \frac{22\,\text{W}}{0.78\,\text{W/m}^2}$$

2) Area Projected at solid angle Formula

Evaluate Formula

Formula

$$\Omega = \frac{\Phi_m}{I}$$

Example with Units

$$8\,\text{m}^2 = \frac{230\,\text{Wb}}{28.75\,\text{cd}}$$

3) Flux at Solid Angle Formula

Evaluate Formula

Formula

$$\Phi_m = I \cdot \Omega$$

Example with Units

$$230\,\text{Wb} = 28.75\,\text{cd} \cdot 8\,\text{m}^2$$

4) Illuminance Formula

Evaluate Formula

Formula

$$E = \frac{\Phi_m}{A}$$

Example with Units

$$8.0702\,\text{lx} = \frac{230\,\text{Wb}}{28.5\,\text{m}^2}$$

5) Incident Luminous Flux Formula

Evaluate Formula

Formula

$$\Phi_i = \frac{\Phi_r}{\rho}$$

Example with Units

$$2\,\text{lm} = \frac{5.1\,\text{lm}}{2.55}$$

6) Intensity on Solid Angle Formula

Evaluate Formula

Formula

$$I = \frac{\Phi_m}{\Omega}$$

Example with Units

$$28.75\,\text{cd} = \frac{230\,\text{Wb}}{8\,\text{m}^2}$$

7) Irradiation Formula

Evaluate Formula

Formula

$$H = \frac{L_p}{A}$$

Example with Units

$$0.7719\,\text{W/m}^2 = \frac{22\,\text{W}}{28.5\,\text{m}^2}$$

8) Light flux Formula

Evaluate Formula

Formula

$$\Phi = \frac{I_{pc}}{P_s}$$

Example with Units

$$3.871\,\text{lm} = \frac{12\,\text{A}}{3.1}$$

9) Light Power Formula

Evaluate Formula

Formula

$$L_p = A \cdot H$$

Example with Units

$$22.23\,\text{W} = 28.5\,\text{m}^2 \cdot 0.78\,\text{W/m}^2$$

10) Luminous Flux incident upon Object Formula

Evaluate Formula

Formula

$$L_i = \frac{L_t}{\tau}$$

Example with Units

$$7.7381\,\text{lm} = \frac{32.5\,\text{lm}}{4.2}$$

11) Luminous Flux Transmitted by Object Formula

Evaluate Formula

Formula

$$L_t = \tau \cdot L_i$$

Example with Units

$$32.34\,\text{lm} = 4.2 \cdot 7.7\,\text{lm}$$

12) Luminous Intensity in Direction at Angle Formula

Evaluate Formula

Formula

$$I_\theta = L_n \cdot A \cdot \cos(\theta)$$

Example with Units

$$5.6085\,\text{cd} = 0.37\,\text{lx} \cdot 28.5\,\text{m}^2 \cdot \cos(1.01\,\text{rad})$$

13) Luminous Intensity in Direction Normal to Surface Formula

Evaluate Formula

Formula

$$I_n = A \cdot L_n$$

Example with Units

$$10.545\,\text{cd} = 28.5\,\text{m}^2 \cdot 0.37\,\text{lx}$$

14) Photoelectric Current Formula

Evaluate Formula

Formula

$$I_{pc} = F \cdot P_s$$

Example with Units

$$12.09\,\text{A} = 3.9\,\text{lm} \cdot 3.1$$

15) Photoelectric Sensitivity Formula

Evaluate Formula

Formula

$$P_s = \frac{I_{pc}}{F}$$

Example with Units

$$3.0769 = \frac{12\,\text{A}}{3.9\,\text{lm}}$$

16) Reflected Luminous Flux Formula

Evaluate Formula

Formula

$$\Phi_r = \Phi_i \cdot \rho$$

Example with Units

$$5.865\,\text{lm} = 2.3\,\text{lm} \cdot 2.55$$

17) Reflection Factor Formula

Evaluate Formula

Formula

$$\rho = \frac{\Phi_r}{\Phi_i}$$

Example with Units

$$2.2174 = \frac{5.1\,\text{lm}}{2.3\,\text{lm}}$$

18) Transmission Factor Formula

Evaluate Formula

Formula

$$\tau = \frac{L_t}{L_i}$$

Example with Units

$$4.2208 = \frac{32.5\,\text{lm}}{7.7\,\text{lm}}$$

Variables used in list of Light Measurement Formulas above

- **A** Surface Area *(Square Meter)*
- **E** Illumination *(Lux)*
- **F** Luminous Flux *(Lumen)*
- **H** Irradiation *(Watt per Square Meter)*
- **I** Luminous Intensity *(Candela)*
- I_n Luminous Intensity Normal to Surface *(Candela)*
- I_{pc} Photoelectric Current *(Ampere)*
- I_θ Luminous Intensity at Angle *(Candela)*
- L_i Luminous Flux Incident upon Object *(Lumen)*
- L_n Luminance Normal to Surface *(Lux)*
- L_p Power *(Watt)*
- L_t Luminous Flux Transmitted by Object *(Lumen)*
- P_s Photoelectric Sensitivity
- **θ** Angle to Normal *(Radian)*
- **ρ** Reflection Factor
- **τ** Transmission Factor
- **Φ** Flux *(Lumen)*
- Φ_i Incident Luminous Flux *(Lumen)*
- Φ_m Magnetic Flux *(Weber)*
- Φ_r Reflected Luminous Flux *(Lumen)*
- **Ω** Area Projected at Solid Angle *(Square Meter)*

Constants, Functions, Measurements used in list of Light Measurement Formulas above

- Functions: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Luminous Intensity** in Candela (cd)
  Luminous Intensity Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Illuminance** in Lux (lx)
  Illuminance Unit Conversion
- Measurement: **Power** in Watt (W)
  Power Unit Conversion
- Measurement: **Angle** in Radian (rad)
  Angle Unit Conversion
- Measurement: **Magnetic Flux** in Weber (Wb)
  Magnetic Flux Unit Conversion
- Measurement: **Heat Flux Density** in Watt per Square Meter (W/m²)
  Heat Flux Density Unit Conversion
- Measurement: **Luminous Flux** in Lumen (lm)
  Luminous Flux Unit Conversion

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