

Practical Applications of Lighting

1 Candela = 1 Lumen

1 lumen = the measure light from one candela on a 1 square foot area the surface of a sphere 1 foot away. Lumens are the OUTPUT. Lumens are what a lamp puts OUT.

1 Foot - Candle = Intensity of light, which is measured where you use it, i.e. the surface of your workspace, your hallway, your driveway, the hospital waiting room, or the top of the surgeon's table.

1 Candela puts out 12.57 lumens, which is the light on the inside of that sphere! This is pretty useless. Don't worry about it!

Inverse square law: See Video

Review Layout and Location on page 2 (3.1.0)

Discuss Direct lightings, point sources lighting, diffuse lighting, and indirect lighting

NEC 110

- Listing 110.3
- Mounting and Cooling 110.13
- Electrical Connections 110.14
- Illumination around Switchboards, and similar equipment 110.26
- Illumination around High Voltage Equipment 110.34(D)

NEC 210

- Branch Circuit Voltage Limitations 210.6
- Bathrooms 210.10(C)(3)
- Lighting Outlets Required 210.70

NEC 410

- Closets 410.2
- Live Parts 410.5
- Listing 410.6
- Wet and Damp 410.10
- Bathtubs 410(D)
- Roof Decking 410(F)
- Clothes Closet 410.16(A)
- Means of Support 410.36
- Grounding 410.40
- Polarization of Screw Shell 410.50

- Disconnecting Means 410.130(G)(1)
- Track Lighting 410.151
- Low Voltage Lighting 411.1

UL listing, and NRTL concept.

Recessed lighting, i.e. can lights. Insulated and non-insulated ceilings. Trims. (See pages 5 and 6 in the textbook.)

Fluorescent fixtures: Discuss why they are so popular. Discuss operations and “color” of light. 3000K and lower are warm, i.e. red and yellows. 4100k and higher are cool, i.e. more blue and green. NEC 410.130(G)

HID, High Intensity Discharge: High and Low bay fixtures. “Work Plane”. What’s a low bay and what’s a high bay?

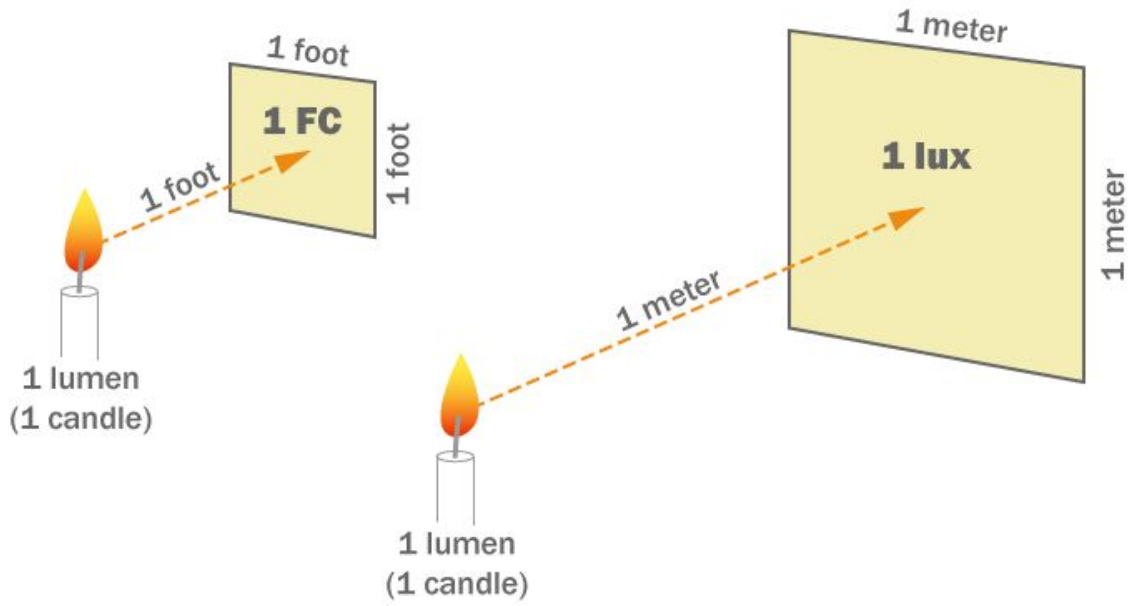
Emergency lighting: NEC 700.15

Egress lighting and Stairway lighting

Induction lighting: coil, ultraviolet light, phosphor coating, and mercury

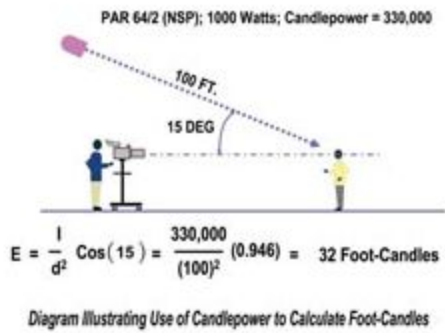
LED, Light Emitting Diode

Tap Rules, we need to go over them!



1 Foot-Candle = 10.7639 Lux
1 Lux = 0.092903 Foot-Candles

1 Meter = 3.28084 Feet
1 Foot = 0.3048 Meters



$$I = d^2 E$$

$$I = (100 \text{ ft})^2 \times 33 \text{ Foot-Candles} = 330,000 \text{ Candlepower (Lumens)}$$

$$E = \frac{I}{d^2}$$

$$E = \frac{330,000 \text{ Candlepower (Lumens)}}{(100 \text{ ft})^2} = 33 \text{ Foot-Candles}$$

$$d = \sqrt{\frac{I}{E}}$$

$$d = \sqrt{\frac{330,000 \text{ Candlepower (Lumens)}}{33 \text{ Foot-Candles}}} = 100 \text{ ft}$$

A 100w bulb put out about 1600 lumens. How many Foot Candles reached the 36" desk if the bulb was 8 feet off the floor?

$$E = \frac{1600 \text{ lumens}}{(8 \text{ ft})^2} = 25 \text{ Foot-Candles}$$

