What are Lighting Design Principles?

Worksheet

Lighting design principles are the rules - including the inverse square law E = I/d - that guide how illuminance, contrast, color and fixture placement are balanced to serve a space's function and mood.

Questions

1. A source of 400 cd is 4 m away. What is the illuminance?

A) 25 lux
B) 100 lux
C) 1600 lux
D) 6.25 lux

2. Doubling the distance from a light source changes illuminance to

A) Half
B) One quarter
C) Double
D) No change

3. Illuminance is measured in

A) Candela
B) Lumens
C) Lux
D) Watts

4. What does luminous intensity (I) describe?

A) Total light output in all directions
B) Light output in a specific direction
C) Illuminance on a surface
D) Color temperature

5. A lamp with luminous intensity 800 cd is 2 m above a desk. Find the illuminance on the desk directly below.

6. A task requires 150 lux and a fixture provides 600 cd. How far away can it be placed?

7. Compare illuminance from a 1000 cd fixture at 1 m versus 3 m.

8. Define: What is the inverse square law in lighting?

9. Define: What is illuminance measured in?

10. Define: If you double the distance to a light source, illuminance

Answer Key

1. A) 25 lux - E = I/d = 400/16 = 25 lux.
2. B) One quarter - E 1/d, so doubling d divides E by 4.
3. C) Lux - Lux is lumens per square meter, the unit of illuminance on a surface.
4. B) Light output in a specific direction - Luminous intensity, in candela, is directional light output.
5. E = I/d E = 800/2 E = 800/4 E = 200 lux
6. E = I/d d = I/E d = 600/150 = 4 d = 2 m
7. At 1 m: E = 1000/1 = 1000 lux At 3 m: E = 1000/3 = 1000/9 111 lux Tripling distance drops illuminance to about 1/9 of the original - the inverse square law
8. Illuminance E = I/d - light intensity on a surface falls off with the square of distance.
9. Lux (lumens per square meter).
10. Drops to one quarter (1/2 = 1/4) of its original value.