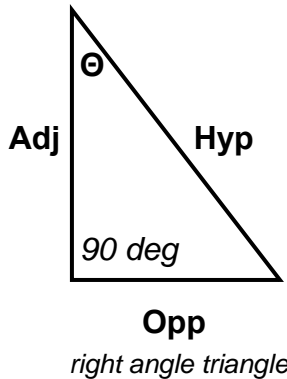


Trigonometry / Geometry



$Adj^2 + Opp^2 = Hyp^2$ AKA $A^2 + B^2 = C^2$

$TAN(\Theta) = Opp/Adj$

$\Theta = Adj/Opp (TAN)^{-1}$

$COS(0deg)=1$ $COS(45deg)=0.7$ $COS(90deg)=0$

Area of a circle = $\pi \times Radius^2$

Perimeter of a Circle = $\pi \times Diameter$

$\pi = 3.14$

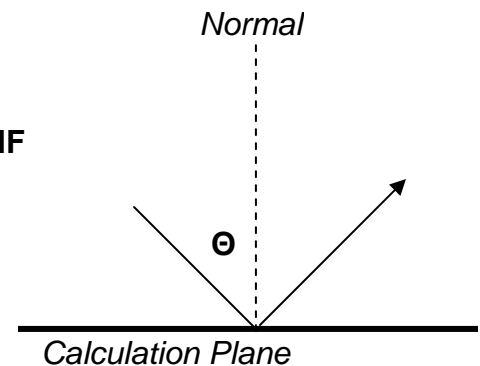
Point-by-Point Calculation

- to determine direct illuminance at any given point

FC facing the fixture = $\frac{Candle\ Power}{Distance^2} \times MF$

FC horiz or vert to the fixture = $\frac{Candle\ Power}{Distance^2} \times COS(\Theta) \times MF$

Θ = the angle of incidence
MF = maintenance factor



Lumen Method Calculation

- to determine an average illuminance of a room

Rectilinear Room $RCR = \frac{5 \times MH \times (L+W)}{Area}$

Irregular Room $RCR = \frac{2.5 \times MH \times (Perimeter\ Length)}{Area}$

$FC = \frac{(Qty\ of\ Fixtures) \times (Lumens\ per\ Lamp) \times (\#\ of\ Lamps\ per\ Fixture) \times CU \times MF}{Area}$

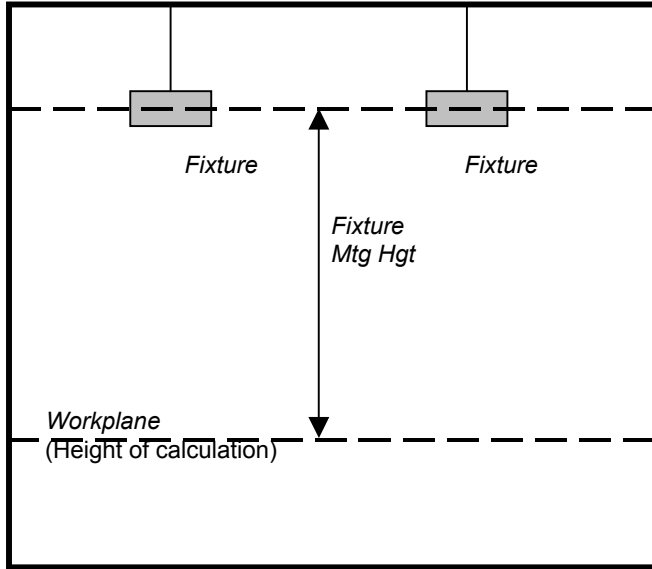
$Qty\ of\ Fixtures = \frac{FC \times Area}{(Lumens\ per\ Lamp) \times (\#\ of\ Lamps\ per\ Fixture) \times CU \times MF}$

MF = maintenance factor
MH = mounting height
CU = coefficient of utilization

Lumen Method Calculation

Project: _____

Room/Area: _____



Room Cavity Ratio:

Room Width (W): _____

Room Length (L): _____

Fixture Mtg Height (MH): _____

$$RCR = \frac{5 \times (MH) \times (L+W)}{L \times W}$$

$$RCR = \frac{5 \times (\quad) \times (\quad + \quad)}{ \quad \times \quad }$$

RCR = _____

Irregular Room

$$RCR = \frac{2.5(MH) \times (Perimeter Length)}{Area}$$

Calculation:

Fixture Description: _____ CU: _____

Lamp: _____ Lamps per Fixture: _____ Lumens per Lamp: _____

$$FC = \frac{(Qty \ of \ Fixtures) \times (Lumens \ per \ Lamp) \times (\# \ of \ Lamps \ per \ Fixture) \times CU \times MF}{L \times W}$$

$$FC = \frac{(\quad) \times (\quad) \times (\quad) \times (\quad) \times (\quad)}{(\quad) \times (\quad)}$$

FC = _____

$$Qty \ of \ Fixtures = \frac{FC \times L \times W}{(Lumens \ per \ Lamp) \times (\# \ of \ Lamps \ per \ Fixture) \times CU \times MF}$$

$$Qty \ of \ Fixtures = \frac{(\quad) \times (\quad) \times (\quad)}{(\quad) \times (\quad) \times (\quad) \times (\quad)}$$

Qty of Fixtures = _____

TABLE 15
RECOMMENDED ILLUMINANCE VALUES

Activity	General Lighting			Task Lighting		
	Public Spaces	Simple Orientation	Occasional Visual Task	Large Visual Task	Small Visual Task	Very Small Visual Task
	3 fc	5 fc	10 fc	30 fc	50 fc	100 fc
GENERAL						
<i>Circulation</i>						
Corridors		•				
Elevators		•				
Lobbies			•			
Stairs		•				
<i>Service</i>						
Toilets and washrooms		•				
<i>Storage</i>						
Active			•			
Inactive		•				
HOSPITALITY FACILITIES						
Bathrooms, for grooming				•		
Bedrooms, for reading				•		
Cleaning			•			
Dining			•			
Kitchen, critical seeing					•	
Laundry				•		
Sewing						•
INDUSTRY						
<i>Assembly</i>						
Simple				•		
Moderately difficult					•	
Difficult						•
<i>Inspection</i>						
Simple				•		
Moderately difficult					•	
Difficult						•
<i>Locker rooms</i>			•			

INTERIOR LIGHTING FOR DESIGNERS

Activity	General Lighting			Task Lighting		
	Public Spaces	Simple Orientation	Occasional Visual Task	Large Visual Task	Small Visual Task	Very Small Visual Task
	3 fc	5 fc	10 fc	30 fc	50 fc	100 fc
OFFICES						
Accounting				•	*	
Conference rooms				•		
Drafting, high contrast					•	
Drafting, low contrast						•
General/private offices				•	**	
Lounges and reception			•			
RESIDENCES						
Bathrooms, for grooming				•		
Bedrooms, for reading				•		
Conversation areas	•					
Dining		•				
Kitchen, critical seeing					•	
Laundry				•		
Sewing					•	
SCHOOLS						
<i>Assembly</i>						
Auditoria			•			
Social activity		•				
<i>Classrooms</i>						
General				•		
Lecture demonstration						•
Science laboratories					•	
STORES						
Circulation			•			
Feature displays						•
Merchandise displays					•	
Sales transactions				•	***	
Wrapping and packaging				•		

*If #4 pencil or harder leads are used for handwritten tasks.

**If tasks involve poor copies, photographs, maps, or 6 point type.

***If handwritten carbon copies.

Based on the IESNA Lighting Design Guide, *IES Lighting Handbook, 9th Ed.* Used with permission from the Illuminating Engineering Society of North America.