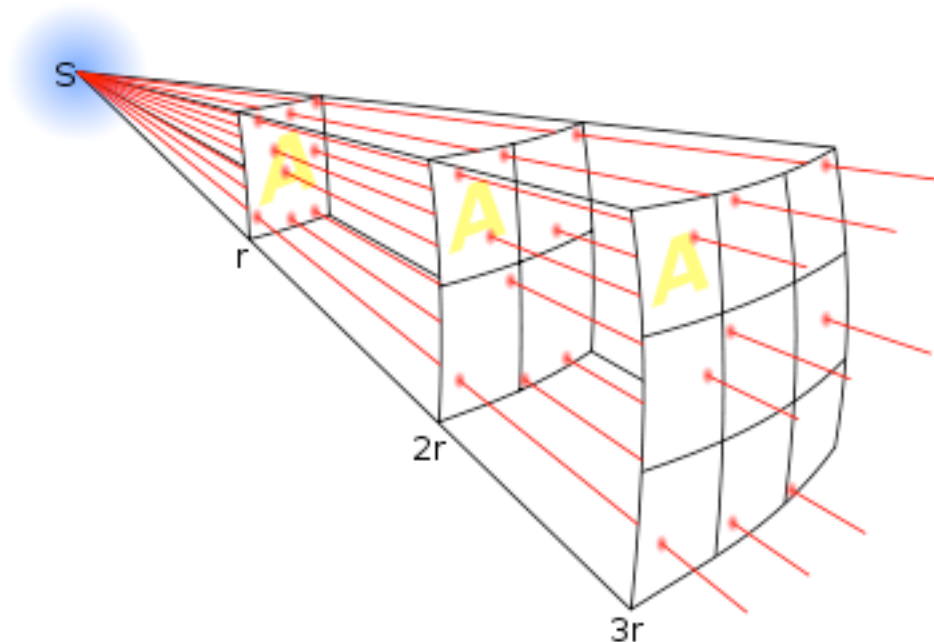


Light as Radiant energy

measuring light

INVERSE SQUARE LAW: the amount of light is inversely proportional to the square of the distance from the source. In [photography](#) and [theatrical lighting](#), the inverse-square law is used to determine the "fall off" or the difference in illumination on a subject as it moves closer to or further from the light source. For quick approximations, it is enough to remember that doubling the distance reduces illumination to one quarter;[\[4\]](#) or similarly, to halve the illumination increase the distance by a factor of 1.4 (the square root of 2), and to double illumination, reduce the distance to 0.7 (square root of 1/2). When the illuminant is not a point source, the inverse square rule is often still a useful approximation; when the size of the light source is less than one-fifth of the distance to the subject, the calculation error is less than 1%.[\[5\]](#)



Light radiates- as in the rest of the radiant spectrum.

Light travels in measure-able units called *wavelengths*.

-light is not just a wave but also acts as a particle-hence the uncertainty of quantum physics.

The Human Body can detect infra-red radiation-which we can't see

(this is the sensation of heat Infa-red radiation = any wavelength longer than .0000276 inch or 800nm

- the body can also detect and react to Ultra-violet light beyond where it is visible. -this reaction is manifested by burns, and cellular breakdown. Ultra-violet is shorter/higher energy wavelengths. smaller than 370nm.

a *spectrum* is a display of a series of radiations lined up according to wavelength. The human eye detects and converts to vision approx. 800nm-370nm

The Standard Candle = a pre determined point of reference for standardization. Is really a unit of brightness or luminous intensity.(the amount of energy is depended on wavelength)

Prior to 1948, was equal to the amount of light from a wax candle made from standardized specifications.

Now called the Candela is now = to monochromatic radiation @ 540 X10¹² cycles and has radiant intensity of 1/683 watt per steradian. abbreviation :Cd

Foot Candle = the brightness produced on a white surface, 1 foot away from a Standard Candle. expressed as 1fc=1lm/ft²

Footcandles and Lux

“Footcandles” and “lux” are units that indicate the density of light that falls on a surface. This is what light meters measure. For example, average indoor lighting ranges from 100 to 1,000 lux, and average outdoor sunlight is about 50,000 lux.

The footcandle is an older unit based on English measurements. It is equal to one lumen per square foot.

It is being replaced by lux, a metric unit equal to one lumen per square meter. One footcandle is 10.76 lux.

Although footcandles are now officially obsolete, they probably will continue to be used because many existing light meters are calibrated in footcandles.

The general term for lux or footcandles is

“illuminance.” The general term is sometimes used by lighting engineers, but the units of lux or footcandles are more commonly used. You use footcandles or lux to measure the adequacy of lighting on the task. Footcandles and lux relate only to the task area, not to the lighting equipment or to the geometry of the space. For example, you could create an illumination level of 100 lux on a surface by using a single spotlight located far away, or by using many cove lights nearby.

Candlepower

“Candlepower” is a measure of lighting concentration in a light beam. It is used primarily with lamps that focus, such as spotlights and PAR lamps. In

lamps where candlepower is specified, the candlepower rating usually applies only to a small spot in the center of the beam.

LUMEN = the quantity of light it takes to illuminate one square foot to the brightness of one foot candle

in terms of electrical energy, 1 lumen = +/-0.001496 watt

lumen output is in all directions-it is up to the consumer to get it to go where it is needed. Lumens

"Lumen" is the unit of total light output from a light source. If a lamp or fixture were surrounded by a transparent bubble, the total rate of light flow through the bubble is measured in lumens. Lumens indicate a rate of energy flow. Thus, it is a power unit, like the watt or horsepower.

Typical indoor lamps have light outputs ranging from 50 to 10,000 lumens. You use lumens to order most types of lamps, to compare lamp outputs, and to calculate lamp energy efficiencies (which are expressed as lumens per watt).

Note that lumen output is not related to the light distribution pattern of the lamp. A large fraction of a lamp's lumen output may be useless if it goes in the wrong directions.

Flux or luminous flux = the total amount of light generated by a source, per unit of time, expressed in lumens- does not describe distribution or direction

Comfortable reading light- to the point your Mother won't tell you that you are going to put out your eyes - is about 30 foot candles.