Title: **DAYLIGHT STUDY**
Ref Number: **10**
Location: **LIGHTING LABORATORY**
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Team Size: **~4**
Environment: **INDOORS**

OBJECTIVE

To investigate the nature of the components of daylight and the effect of window orientation on their distribution on the working plane.

APPARATUS

THEORY

The measurement of illuminance due to daylight is not significant owing to the fact that daylight varies with the time of day and with season. The quantity of daylight is measured in terms of the illuminance received at a point in the room and the simultaneous illuminance received at a point, outside the building, from a complete hemisphere of the sky, i.e. the cell used has an unobstructed view of the whole sky. This ratio is known as the **daylight factor**.

To enable the daylight factor to be measured a metering system has been constructed which uses two photocells, one placed inside the room and the other in an exterior unobstructed position. The sensitivity of the system is set using the outside photocell, and then the output of the inside photocell is measured at this sensitivity. This enables the ratio to be read directly from the instrument as a percentage daylight factor.

PROCEDURE

The experiment uses an artificial sky to simulate a standard overcast sky and a model room having an adjustable window in which the Daylight Factor measurements are made.

The window size and position may be adjusted as shown in Figure 1. For each window measure the daylight factor at the positions indicated on the model over ½ of the floor area, i.e. the axis of symmetry.

Components of Daylight Factor

Light from the sky reaches a point within a room both directly and indirectly, and the sum of these components forms the daylight factor [1]

The experimental equipment simulates only an unobstructed sky outside the room and hence the External Reflected Component is ZERO.

In order to evaluate the sky component the internal surface of the model are covered with black card and thus the daylight factor measurements under these conditions will have almost zero internally reflected component and as such will be a measurement of the sky component only.

Daylight Factor= Sky Component + Internally Reflected Component + Externally Reflected Component

Externally Reflected Component = 0, and the sky component at each point is known

Internally Reflected Component = Daylight Factor – Sky Component

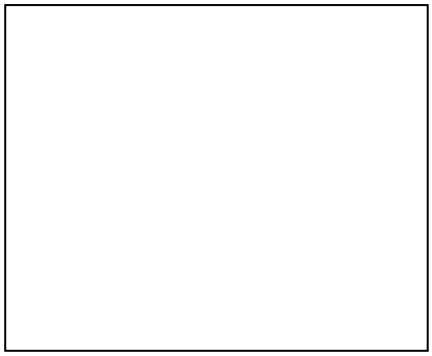
RESULTS

For the measurement of Daylight Factor, Sky Component calculate the Internally Reflected Component.

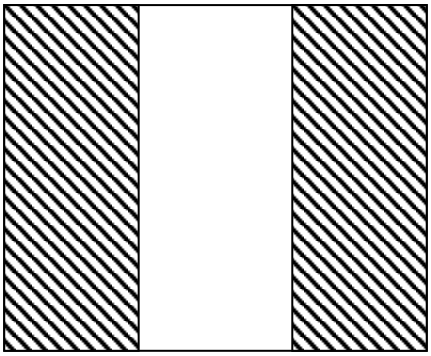
Plot ISO daylight factor on
i) the distribution
ii) the proportion of Internally Reflected Component to Sky Component

[1] Building Research Establishment Digest No. 41 and No. 42.

(a)

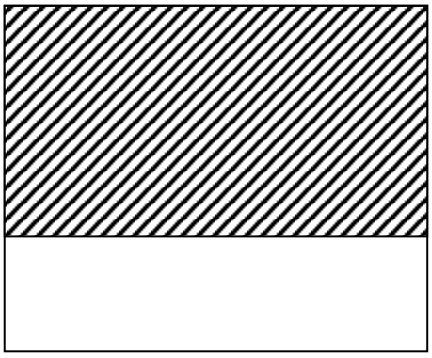


(b)

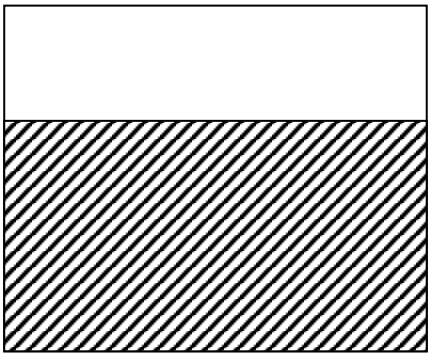


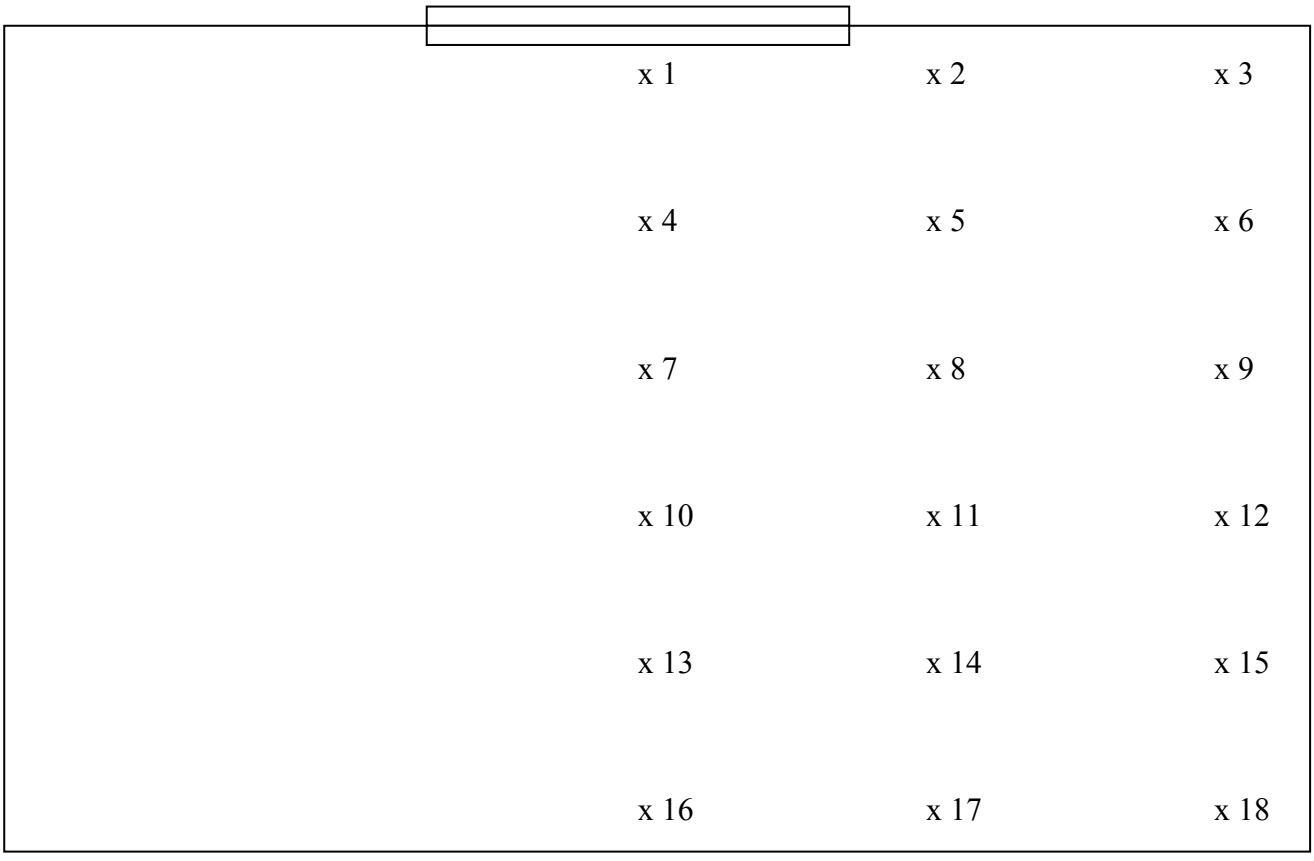
(c)

(d)



(e)





Model Plan with 18 measurement positions