### 3.8.3.2 Room index

To use utilisation factor tables it is necessary to have values for the room index ($K$) and the reflectance values of the main room surfaces.

The room index is a measure of the proportions of the room (see Figure 3.15). For rectangular rooms the room index is:

$$K\{(L \times W)/(L + W)h_m\}$$

where $L$ is the length of the room; $W$ is the width of the room; $h_m$ is the height of the luminaire plane above the horizontal reference plane. Only if the luminaires are recessed and the working plane is on the floor is $h_m$ the floor to ceiling height.

Results may be rounded to the nearest value in the utilisation factor table. If the room is re-entrant in shape (e.g. L-shaped), then it must be divided into two or more non re-entrant sections that are treated separately.

When large areas are subdivided by screens, partitions, structural elements, furniture or machinery that project about the working plane, it is usually advisable to calculate $K$ for the smaller enclosed areas (see sections 1.4, Variation in lighting, and 3.8.4, Specification and interpretation of illuminance variation).

### 3.8.3.3 Effective reflectance

In order to use utilisation factor tables correctly, the effective reflectances of the ceiling cavity, walls and floor cavity must be calculated.

For the ceiling and floor cavities the cavity indices $CI_C$ and $CI_F$ must be calculated. The cavity index (CI), which is similar in concept to the room index, is given by the following:

$$CI = \frac{\text{(Mouth area of cavity + Base area of cavity)}}{\text{Wall area of cavity}}$$

For rectangular rooms:

$$CI_C \quad \text{or} \quad CI_F = LW/(L + W)h = (K \times h_m)/h$$

where $h$ is the depth of the cavity.

The effective reflectance $RE_X$ of the cavity $X$ can then be determined from Table 3.8, or from the simplified, but less accurate, formula:

$$RE_X = (CI_X + RA_X)/\{CI_X + 2(1 - RA_X)\}$$

where $RA_X$ is the area-weighted average reflectance of the cavity $X$, and $CI_X$ is the cavity index of the cavity $X$.

The average reflectance $R_X$ of a series of surfaces $S_1$ to $S_n$ with reflectances $RS_n$ and areas $A_1$ to $A_n$, respectively, is given by:

$$RA_X = \frac{\sum_{y=1}^{n} R(Sy)A(y)}{\sum_{y=1}^{n} A(y)}$$

It should be noted that in order to calculate the effective reflectances, it is not necessary to know the colours of the surfaces, only the value of reflectance (see SLL publication *Lighting Guide 11: Surface Reflectance and Colour*).