INTERIOR DESIGN AND PLANNING

A professional interior designer is one who is qualified by education, examination and experience to identify research and creatively solve problems relative to the function and quality of people’s interior environments. The course of study in interior design leads to a first professional degree.

The program focuses on improving the quality of life and protecting human health and safety through design of interior environment. Students study design fundamentals, theory, process, communication, research and technology to identify and solve problems for a wide range of physical interior environments for all individuals regardless of socioeconomic background.

Students learn how to approach design problems through a methodology that includes data gathering, product specification, identification of details, contractual documents and design business procedures.

PRINCIPLES OF INTERIOR DESIGN

1. GROUND RULES FOR GOOD DESIGN

The basic rule of good design is first to get the framework of a space right and only then to look after the contents. It means first assessing the space available and then making decisions about how to manipulate it – whether cosmetically, by purely decorative means, or structurally – to its best advantage.

Design is also about understanding how scale and balance contribute to making a room look comfortable and inviting. It is about handing light, whether natural or artificial; the way a colour is chosen and mixed, matched or contrasted to its greatest effect; and the way mixtures of texture and pattern can be assembled and built up. These are the essential ingredients which are dealt with in this section. All must be taken into consideration if
the design of a home is to be given a firm basis and create a lasting impression.

**Good Use of Space**

Lack of space, lack of rooms, lack of wherewithal to expand, there are perennial problems shared by almost everyone. Yet a curiously large number of people seem just to accept them. To alter the feeling of spaciousness in a place you do not necessarily have to change its basic structure. And the feeling is what most space is about, not the actual footage. Ironically, people who actually have too much space find it just as awkward to arrange comfortably as those with too little. With personal experience of both, I have found it far easier to sit people sensibly in a small sitting room than in a very large, L shaped room.

**Multi-purpose rooms**

At the simplest level, a home that is owned, as opposed to a rental, could be improved by the elementary expedient of changing the functions of various rooms, or by altering the layout. Almost any room can be made multi-purpose. A kitchen, if it is large enough, can also be used for a general eating and family room. A dining room or a guest room can also double as a study; bedrooms can always be made into bed/sitting/work rooms just by adding appropriate furniture. It often happens that in the reshuffle you gain an extra room.

In every house, there is usually space being wasted somewhere that can be utilized: landing and corridor space; the area under the stairs; blank walls; odd corners. Used with imagination, these spaces can often relive congestion elsewhere. The secret is to be flexible, to question convention and to have no rigid ideas when it comes to the function of a room.

**2. ALTERING SPACE COSMETICALLY**

Limited space can be expanded or too much space lessened by thoughtful decoration. Knowing how to juxtapose height and width, when to use large
patterns and when small, when to offset an angle with a curve, or vice versa, all are important when it comes to achieving well-designed and proportioned rooms. The following guidelines should be useful for when it comes to redecorating problem areas.

**Expanding Space**

Since pale colours recede, the lighter the wall and floor colours, the larger a room will seem. If a ceiling seems too low, you can raise it visually with a coat of light paint. Shiny, reflecting surfaces always seemingly make for a sense of space in a room, so use glossy paint to push back walls. The removal of a picture moulding or chair rail will also help make room seem less constricted and cramped.

There is no doubt that patterns with a strong geometric or directional feel can appear to push out and extend floors and walls. Patterned carpets or wall coverings with a light background give a feeling of depth and patterns on a dark background do tend to enclose.

**Lessening Space**

Strong, dark colours seem to move in, so if a ceiling seems too high in proportion to the rest of the room, an intense colour will help bring it down visually. To make a room seem more compact, add a continuous band or stripe of colour, or a contrasting picture moulding round a room, soft, matt surfaces diminish a sense of space, so use non-shiny paint for the walls of an over large room.

**Learning about scale**

At first, it always helps to look at possessions in other people’s homes. Remember what furniture is used to enlarge an area, and what dwarfs it. Notice which colours, textures and patterns complement or contrast with each other.
Aim to balance solidity with delicacy, softness with hardness, height with depth. Furniture kept at much the same level makes for a greater sense of space. But remember that the effect of a continuous low level is enhanced by one or two judiciously placed objects; a rangy plant, or an arrangement of paintings.

A good sense of scale is quite easy to acquire if you always remember to look at closely and learn from other people’s rooms which particularly please you.

3. USING MIRRORS

It is always useful to know how to create a feeling of depth in a room. How to achieve the illusion of extra space.

*Creating a three-dimensional effect*

Think consciously, first of all, of creating a foreground, middle ground and back-ground, a definite, three-dimensional effect. The can be drawn out and along by diagonal or geometric lines painted on door are walls, or by similar geometric or directional patterns on the floor. Any rectangular room can be made to look wider if the floor – or ceiling boards or tiles are run at an angle.

A mirror on a table or mantelpiece with plants or some small objects in front of it will also give depth. As will a hinged screen in a corner behind a sofa or table.

*Using mirror*

Mirrored surfaces will always give added length, depth and width to a room. Mirror tiles are less expensive than whole sheets of mirror, but although there are no distracting divisions with whole sheets, bear in mind the size of vast expanses of mirror when it comes to getting them through doorways and around corners. It is always wise to consider the possibility of expensive waste when a sheet of mirror is cracked during installation—unfortunately not such a rare occurrence these days.
**Where to use mirror**

If the space could do with doubling, use mirror to cover an entire wall, if it can be afforded and fit it form floor to ceiling, extending it right into the corners. If plain mirror seems unsubtle, one compromise is to insert metal supports between lengths of mirror to hold glass or Perspex shelves for books and small objects.

To help lose definition at the edges of a small room, and add extra sparkle, use thin strips of mirror to edge the top of the walls, just below the ceiling. Mirror alcoves; mirror between long windows; mirror backs of doors; mirror the side wall of a narrow staircase; mirror the ceiling of a small room. If you windows have wide embrasures, mirror them to both double the reflected light and maximize the view outside.

Even the bases of sofas, seating units or chairs can be mirrored so they appear to float; tall screens can be mirrored for an illusion of extra height. And remember that etched or patterned mirror has a decorative quality all of its own, quite apart from its reflective value.

4. **CREATING SPACE STRUCTURALLY**

The simplest and least expensive structural alterations can be made to doors. They can be adjusted to swing in the opposite direction so extra furniture can be fitted into a space. Old doors can be blocked off or new, more conveniently placed ones can be cut into the walls. If the space is minimal, but a door is necessary, put in a folding door or narrow swing doors. If a new partition wall is being put up anyway, it might be possible to put in a door which slides into it.

**Internal windows**

Long, thin slits can be cut in walls to give extra light and depth to room and small, narrow windows set either side of a fireplace will add new views, give slivers of extra light and take up very little wall space. Remember that internal windows can be opened up between rooms for extra light and depth.
Non-structural partition wall can be cut halfway to the floor, or to seating level.

Modifying the ceiling always make an enormous difference to the space style and interest of a room. It can be lowered all round at the perimeter so that the central space seems to soar, or the central area of the ceiling can be lowered, perhaps over a dining table, for greater intimacy.

**Changing levels**

For many people, a flexible change in levels is seen as the best way of making the best of a small space. Multi-levels are especially useful for one-room living, and can be sued to divide off the various areas without the space seeming muddled and confused.

Even if a room is of ordinary height, it is usually possible to build in a variety of platforms-depending on where the room is situated in a building and on the latter’s structure. The extra weight is seldom any more than the normal furnishings and seating which it replaces.

**5. FURNITURE ARRANGEMENTS**

It lack of spaces is a problem the first basic thing to remember is that tables. Desks and chairs made of glass or Perspex, or pieces of furniture that are surfaced in mirror, look much lighter and less bulky than more solid pieces, Two small couches always look neater than four chairs, and likewise, two small seating units pushes together will take up less room than a couple of chairs. Large articles of furniture should be kept against a wall.

Corners can be used more; beds placed on the diagonal make a room look much more interesting; cupboards and desks also look particularly effective straddling corners, storage all down one side of a room can look neater than separate desks, bookshelves liquor cabinets or other kinds of cupboards.
**One-room living**

In a once-room apartment, a double bed can look too obvious and bulky. Use a pair of day-beds or chaises instead, and pile them high with pillows. By day these can be used for seating and by night they can be pushed together to make a bed. Pare down as much as possible to avoid clutter, but beware of discard pieces of furniture to the extent that all character and individuality is lost.

**6. LIGHTING: LAMPS AND FITTINGS**

*Significant lighting parameters*

The radiated power of light, as perceived by the eyes, is measured in terms of the luminous flux $\phi$. The luminous flux radiated per solid angle in a defined direction is referred to as the light intensity. The intensity of a light source in all directions of radiation is given by the light intensity distribution, generally represented as a light intensity distribution curve. The light intensity distribution curve characterizes the radiation of a light source as being narrow, medium or wide, and as symmetrical or asymmetrical.

The luminous flux per unit area is the lighting intensity or illuminance $E$. Typical values:

<table>
<thead>
<tr>
<th></th>
<th>Max. [100000\text{ Ix}]</th>
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</thead>
<tbody>
<tr>
<td>Global radiation (clear sky)</td>
<td>Max. [20000\text{ Ix}]</td>
</tr>
<tr>
<td>Global radiation (cloudy sky)</td>
<td>Max. [200\text{ Ix}]</td>
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<tr>
<td>Optimum sight</td>
<td>[2000\text{ Ix}]</td>
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<td>Minimum in the workplace</td>
<td>[200\text{ Ix}]</td>
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<tr>
<td>Lighting orientation</td>
<td>[20\text{ Ix}]</td>
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<tr>
<td>Lighting orientation</td>
<td>[10\text{ Ix}]</td>
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<tr>
<td>Moonlight</td>
<td>[0.2\text{ Ix}]</td>
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</table>

The lighting density $L$ is a measure of the perceived brightness. For lamps it is relatively high and results in glare, which necessitates shielding for lights.
in indoor areas. The lighting density of room surfaces is calculated using the lighting intensity $E$ and the degree of reflection.

**Lamps**

Lamps convert electrical power (W) into luminous power (lumen, lm). The light yield (lm/W) is a measure of efficiency. For internal room lighting, filament and discharge lamps are used.

Filament lamps typically provide warm white light that is flicker free can be dimmed without restriction and give very good colour of halogen bulb, and their compact size allows small lighting outlines and very good focusing characteristics (e.g. spotlights). However, filament lamps also have a low lighting efficiency (lm/W) and a relatively short bulb life of between 1000 and 3000 hours.

Discharge lamps usually operate with a ballast device and sometimes an ignition system, and offer high lighting efficiency with relatively long life (between 5000 and 15000 hours). The colour of the light depends on the type of lamp: warm white, neutral white or daylight white. Colour rendering is moderate to very good but it is only possible to dim the lamps to a limited extent. Flicker-free operation can only be achieved by the use of an electronic ballast device.
General lighting symbols for architectural plans

- power supply rail with lamps
- supply/tube track system
- supply track with light fitting
- installation/assembly: pendant light fitting, round/cylindrical
- wall floodlight, directed beam round/cylindrical
- installation/assembly: pendant light fitting, square
- installation/assembly: pendant light fitting, rectangular

Standard lighting symbols for architectural plans

- light fitting, general
- light fitting, number of bulbs, power
- light with switch
- safety light in battery circuit
- safety light in standby circuit
- spotlight
- fluorescent lamps/general
- socket in strip arrangement, power
- socket, number of lamps, power
- light fitting for discharge lamp/general

Diagrams of lamp types
Different Lamp types

**filament lamps**

- **A**
  - P(W): 60–200 general purpose lamp (bulb)

- **PAR 38**
  - P(W): 60–120 reflector lamp

- **PAR 56**
  - P(W): 300 reflector lamp

- **R**
  - P(W): 60–150 reflector lamp

- **A**
  - P(W): 25–100 soft-tone lamp

- **A**
  - P(W): 25–100 krypton lamp

- **A**
  - P(W): 15–60 candle lamp

- **A**
  - P(W): 35–120 strip light
halogen filament lamps

QT

QT-DE

P(W): 200–500

P(W):
300
500
750
1000

PAR 38 (QR 122)

P(W): 75–250
parabolic reflector lamp

low-voltage halogen lamps

QT

P(W): 20–100

GR-48

P(W): 20
reflector lamp

QR-CB

P(W): 20–75
cold light reflector

QR-111

P(W): 35–100
reflector lamp
high-pressure discharge lamps

HME       P(W): 50–400 mercury vapour lamp

HMR       P(W): 80–125 mercury vapour reflector lamp

HIR       P(W): 250 halogen metal vapour reflector lamp

HIT-DE    P(W): 70–250 halogen metal vapour lamp

HIT       P(W): 35–150 halogen metal vapour lamp

HIE       P(W): 75–400 halogen metal vapour lamp

HST       P(W): 35–100 halogen metal vapour lamp

HSE       P(W): 50–250 sodium vapour lamp
**fluorescent lamp**

\[
\begin{array}{c|c}
T & P(W) \cr & 18 \cr & 36 \cr & 58 \end{array}
\]

**compact fluorescent lamps**

\[
\begin{array}{c|c}
T & P(W) \cr & 7 \cr & 9 \cr & 11 \cr & 10 \cr & 13 \cr & 18 \cr & 18 \cr & 24 \cr & 36 \cr & 7 \cr & 40 \cr & 11 \cr & 55 \cr & 15 \cr & 20 \end{array}
\]

with built-in ballast

**comparison:** up to 80% saving in electricity, life expectancy ten times greater

| 25 W | 5 W |
| 40 W | 7 W |
| 60 W | 11 W |
| 75 W | 15 W |
| 100 W | 20 W |
| 120 W | 23 W |
### Allocation of lamp types and lighting types

<table>
<thead>
<tr>
<th>Lighting type</th>
<th>Handlighting</th>
<th>Sconces</th>
<th>Spotlights</th>
<th>Marshals' light</th>
<th>Square grids</th>
<th>Rectangular grids</th>
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<tbody>
<tr>
<td>A</td>
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**Light fittings and light distribution**

- Pendent light
- Wall fixture
- Surface-mounted fixture
- Spotlights
- Indirect light
LIGHTING ARRANGEMENT

Lighting Quality Characteristics

Any good lighting design must meet functional and ergonomic requirements while taking cost effectiveness into account. In addition to the following quantitatively criteria, there are qualitative in particular architectural, criteria which must be observed.

Level of illumination

A mean level of between 300lx (individual offices with daylight) and 750lx (large rooms) is required in work areas. Higher illumination levels can be achieved in uniform general lighting through the addition of lighting at workplace positions.

Light direction [Refer Fig. – 1]

Ideally, light should fall on a working position from the side. The prerequisite for this is a wing-shaped light distribution curve.

Limitation of glare [Refer Fig. – 2 & 3]

Direct glare, reflected glare and reflections from monitor screens should all be limited. Limiting direct glare is achieved by using lights with shading angles $\geq 30^0$.

Limiting reflected glare is achieved by directing light from the side onto the working position, in conjunction with the use of matt surfaces on the surrounding areas.

Limiting reflections from monitor screens requires the correct positioning of the screen. Lighting which nevertheless still reflects on a screen must have a luminance of $\leq 200 \text{ cd/m}^2$ in these areas.
**Distribution of luminance**

The harmonic distribution of luminance is the result of a careful balance of all the degrees of reflection in the room, Table - 7. Luminance due to indirect lighting must not exceed 400 cd/m².

**Colour of light and colour rendering**

The colour of the light is determined by the choice of lamp. A distinction is made between three types: warm white light (colour temperature under 3300K), neutral white light (3300-5000 K) and white daylight (over 5000 K) in offices, most light sources are chosen in the warm white or neutral white ranges. For colour rendering, which depends on the spectral composition of the light, stage 1-9 very good colour rendering should generally be sought.

**Calculation of point illuminance levels [Refer Table – 6]**

The illuminance levels (horizontal $E_h$ vertical $E_v$) which are generated by individual light sources, can be determined from the luminous intensity and the spatial geometry (height $h$, distance $d$ and light incidence angle $\alpha$) using the photometric distance principle.

![Correct arrangement of lights in relation to work position: light from the side](image)

1. Correct arrangement of lights in relation to work position: light from the side
2. Working surfaces, monitor screens, keyboards and paper should have matt surfaces.

3. Lights which can generate reflections should have low luminance levels in the critical incidence range.

4. Luminance of indirect lighting.

5. Illuminance at a point.
7. CHOOSING COLOUR SCHEMES

Planning a colour scheme often seems an insurmountable task to the inexperienced. One way to begin is to take a colour in depth. Take green, for example, and think of trees through the seasons; the different greens of herbs, from the sharp freshness of parsley or chives to the gray-green of sage and blue-green of rosemary. Or try thinking of precious stones; or the striated, cool, green of some slates. Think of moss and lichen, algae and seaweed, variegated ivy and honeysuckle, the browny-greens of ponds and the clear, blue-green of sea struck by sun. Natural combination like these can be used to build up interesting,
monochromatic schemes, especially when contrasted or accented with other colours that set them off quite naturally.

**Ideas for colour schemes**

In a white scheme for example, the walls and curtains might be a pale string colour, the carpet would be white, white, with sofa in honey and chairs a silver gray; cushions and plants or flowers would also be white for a brown scheme, the walls would be a white.

For a brown scheme, the walls would be a coca-cola colour, the curtains would be chestnut brown and the carpet black or brown; the sofa would be white and the chairs natural-coloured, with scarlet cushions and shocking pink flowers as accents. In rooms with pale beige walls, the curtains would match, the carpet would be dark brown and the sofa would be the chairs natural – coloured, with scarlet cushions and shocking pink flowers as accents. In rooms with pale beige walls, the curtains would match, the carpet would be dark brown and the sofa would be the colour of milk chocolate; any chairs would be Chinese yellow, the cushions would be white and flowers, orange or yellow. In a gray scheme, the walls might be a pale gray, the curtains white and the carpet yellow; there would be a dark gray sofa and black chairs with lemon cushions; any flowers would be yellow. Where the wall are very pale pink, the curtain could be white and the carpet a sand colour; the sofa would be moss green, with shocking pink cushions and scarlet flowers to spike the pastels. These are just some ideas; remember that texture is an important ingredient and will affect the impact of any colour. And remember, too, that pale colours tend to look good in sunny rooms, while north facing ones always look more cheerful if warm, luminous colours are used.

A space will always seem more cohesive if more or less the same colours are used throughout. Ideas about continuing a feeling throughout a house or apartment are dealt with in the Room- by- Room Guide.
8. USING TEXTURE AND PATTERN

If sure use of colour is absolutely basic to good decorating, a feeling for texture and pattern is the refinement or gloss and should be considered just as seriously as the whole process of building up colours in a room. Colours can be so radically changed or modified by cleverly used texture and pattern, that through its subtlety of finish, even a one-colour room can be made to look just as lively and interesting as a more vividly coloured counterpart. And just as good juxtapositions of colour add immediate interest in a room, so thoughtful contrasts of texture and pattern, or both, can add to the overall visual effect, but in a gentler less obvious way.

Textural build-up

Interestingly, textures are often as evocative as colours. Take, for example, these well-known finishes; boarding, brick, Hessian, brass, cane, ceramic, coir matting corduroy, cotton, cork, denim, felt, glass, lace, lacquer, leather, linen, marble, mirror, plaster, Perspex, rush, sailcloth, satin, silk, sisal, sheepskin, slub, slate, steel, stone, suede, terracotta, travertine, trellis, velvet, wicker, wood (natural and polished), wood slats, wool, wool cord. If you isolate each one in your mind, you can practically feel as well as see its surface. Imagine how each one would look appropriately applied to floors or ceilings, walls, furniture, windows and accessories. Contrast the varying qualities of the possibilities inherent in intelligent mixing of textures, the ability to build up comfort, or hard with soft, smooth with rough, matt with shine.

Clearly, some textures seem to go better together than others, but this is mainly a matter of taste and practicality. Look at the sample for ideas, and look around for samples of carpet, matting, fabrics, vinyl's, wallpapers, wall coverings and various tiles so you can see the possibilities for yourself. But rather than just colour matching or contrasting, find out which ones make the most interesting combinations, and which textures seem actually to enhance something else.
Most people know that rough textures probably mix well with smooth ones, that matt goes well with gloss, but which rough surfaces should be mixed with which smooth ones, what matt juxtaposed with what gloss? As a general rule, coarse fabrics like Hessian or tweed usually look far better in rooms with rough, brick walls than more refined materials like silk or stain; lacquered furniture will look far more effective against velvet-covered walls than the same pieces made from Perspex. Which of your furnishing accessories, for example, has a particular softness, or depth, or gleam to it, and what can you put beside it to make those qualities stand out?

Will the introduction of a plant or a vase of flowers help soften the shiny, hard-edged effect of a collection of silver or ceramics; or can a large, solid piece of sculpture be offset by a tall, yet insubstantial plant? Further information about building up pleasing arrangements of objects and mixing and matching textures and patterns.

**Unusual paint techniques**

Remember, too, the various methods for painting walls. Each type of finish, whether lacquered or glazed, rag-rubbed or dragged, combed or flat will, to a greater or lesser degree, alter the feel of a textural build-up. For more information about the more unusual painting techniques.

Even when a room seems finished, the introduction of one more texture could make the same difference to its interest and vitality as a sudden and unexpected injection of colour. A chance incident might point something out: a basket left on a floor; a heavy woolen cardigan thrown over a chair; a brass container lying on a table, suddenly, a quite unexpected surface seems so right, so delineating of the other surface and colours in a room, that one cannot imagine why it was not thought of in the beginning. This gradual, relaxed accretion of experience, ideas and possessions is what decoration is about, after all.
**Mixing patterns**

Mixing patterns can be a daunting exercise to the uninitiated, who may fear the distracting effect pattern piled on pattern can have. Historically, of course, people have always mixed pattern and ornament, if not with abandon, at least with a fine air of certainly. Think of the cornices, fabrics and rugs of Europe in the seventeenth century; the elaborate ceilings, damask wall coverings, mouldings, chair coverings and carpets of the eighteenth century; the stripes and silks, Turkey rugs, mahogany, figured velvets and lace antimacassars of the 1900s, the jazzy mixtures of the Twenties.

**GOOD USE OF PATTERN**

**Grouping similar tones**

Mixing patterns is really a question of achieving the right scale, colour and balance. If you put together a number of prints which share much the same colouring or tones, some will appear to work, together much better than others, and, as with textures, these might actually enhance one another (especially if linked by areas of a plan colour predominant in the pattern). It is all too easy to under estimate the intricate patterning of accessories such as plants and books, pictures, objects, and ceramics, and the shapes of furniture, even before you think of the choice of fabrics and wallpapers, rugs, carpets, wall coverings and tiles.

**Massed ethnic prints**

Or think of the way a mass of Indian printed cottons can look effortlessly harmonious, their patterns all very much the same size and in good proportion with each other. Look at how their colours intermingle and repeat each other, and you begin to understand the principle of mixing and matching and will begin to feel more confident of putting it into practice.

Even the flimsiest of sheers can be used in the build-up of patterns in a room if they are chosen with a similar or matching design to the curtains.
The pattern could be simply white on white, or in a toned-down version of the main colours, or it could be a simplified version of the curtain motif, in one colour on white. The effect will be less interesting than less subtle combinations.

**Play with pattern**

A play of pattern, properly manipulated, can be very beneficial to a room, influencing as it does the whole balance of colour. And sensitively worked, pattern can often give the illusion of added depth and therefore space to a room, as well as giving it a recognizable personality. Many of the hazards of experimentation are taken out of one's hands these days now that manufactures are producing coordinated ranges of fabrics, wall papers, wall covering, tiles and sometimes carpets all designed to be mixed and matched according to taste, space and circumstances.

As ever, the only way to learn is to observe and experiment, to find patterns and combinations that appeal and then try them out for yourself. Give them as much careful consideration as you would colour, and aim to avoid choosing overtly fashionable patterns which can make a room seem dated in no time at all.
ANTHROPOMETRIC STANDARDS

Man’s Dimensional Relationships

The calculations for a man’s body were based on the lengths of heads, faces or feet. These were then subdivided and brought into relationship with each other, so that they were applicable throughout general life. Even within our own lifetimes, feet and ells have been in common use as measurements.

\[
\begin{align*}
\frac{1}{2} h & = \text{the whole of the top half of the body, from the crotch upwards.} \\
\frac{1}{4} h & = \text{leg length from the ankle to the knee and from the chin to the navel} \\
\frac{1}{6} h & = \text{length of foot} \\
\frac{1}{8} h & = \text{head length from the hair parting to the bottom of the chin, distance between the nipples} \\
\frac{1}{10} h & = \text{face height and width (including the ears), hand length to the wrist} \\
\frac{1}{12} h & = \text{face width at the level of the bottom of the nose, leg width (above the ankle) and so on.}
\end{align*}
\]

The sub-divisions go up to \( \frac{1}{40} h \).

During the last century, A. Zeising, brought greater clarity with his investigations of the dimensional relationship of man’s proportions. He made exact measurements and comparisons on the basis of the golden section.
geometrical division of length a by employing the golden section
MAN DIMENSION AND SPACE REQUIREMENTS

Body measurements [in accordance with normal measurements and energy consumption]
Space Requirements

SPACE REQUIREMENTS BETWEEN WALLS
for moving people, add 10% to widths

SPACE REQUIREMENTS OF GROUPS

STEP MEASUREMENTS

SPACE REQUIREMENTS OF VARIOUS BODY POSTURES

SPACE REQUIREMENTS WITH LUGGAGE

SPACE REQUIREMENTS WITH STICKS AND UMBRELLAS

In accordance with normal measurements and energy consumption
Dimensions for Railway Carriages

1. Local passenger tonnage carriage, plan view
2. Intercity express carriage, plan view
3. Top deck: 6-axle double-decker carriage
4. Lower deck: 6-axle double-decker carriage
5. Top deck: 4-axle double-decker carriage
6. Lower deck: 4-axle double-decker carriage with catering compartment, restaurant and luggage van

MAN SMALL SPACES
The function of housing is to project man against the weather and to provide an environment that maintains his well-being. The required inside atmosphere comprises gently moving (i.e. nor draughty), well oxygenated air, pleasant warmth and air humidity and sufficient light. To provide these conditions, important factors are the location and orientation of the housing in the landscape as well as the arrangement of spaces in the house and its type of construction. The prime requirements for promoting a lasting feeling of well-being are an insulated construction, with appropriately sized windows placed correctly in relation to the room furnishings, sufficient heating and corresponding draught-free ventilation.

**The need for air**

Man breathes in oxygen with the air and expels carbon dioxide and water vapour when he exhales. These rays in quantity depending on the individual's weight, food intake, activity and surrounding environment.

It has been calculated that an average human beings produce 0.020m$^3$/h of carbon dioxide and 40 g/h of water vapour.

A carbon dioxide content between 1 and 3 % can stimulate deeper breathing, so the air in the dwelling should not, as far as possible, contain more than 1 %. This means, with a single change of air per hour, a requirement for an air space of 32 m$^3$ per adult and 15 m$^3$ for each child. However, because the natural rate of air exchange in free-standing buildings, even with closed windows, reaches 1½ to 2 times this amount, 16 – 24 m$^3$ is sufficient (depending on the design) as a normal air space for adults and 8 – 12 m$^3$ for children. Expressed another way with a room height ≥ 2.5 m, a room floor...
area of 6.4 – 9.6 m² for each adult is adequate and 3.2 – 4.8 m² for each child. With a greater rate of air exchange, e.g. sleeping with a window open, or ventilation via ducting), the volume of space per person for living rooms can be reduced to 7.5 m³ and for bedrooms to 10 m³ per bed.

Where air quality is likely to deteriorate because of naked lights, vapours and other pollutants (as in hospitals or factories) and in enclosed spaces (such as you in an auditorium), rate of exchange of air must be artificially boosted in order to provide the lacking oxygen and remove the harmful substances.

**Space Heating**

The room temperature for humans at rest is at its most pleasant between 18° and 20°C, and for work between 15° and 18°C, depending on the level of activity. A human being produces about 1.5 kcal/h per kg of body weight. An adult weighing 70 kg therefore generates 2520 kcal of heat energy per day, although the quantity produced varies according to the circumstances. For instance it increases with a drop in room temperature just as it does with exercise.

When heating a room, care must be taken to ensure that low temperature heat is used to warm the room air on the cold side of the room. With surface temperatures above 70 - 80°C decomposition can take place, which may irritate the mucous membrane, mouth and pharynx and make the air feel dry. Because of this, steam heating and iron stoves, with their high surface temperatures, are not suitable for use in blocks of flats.

**Room Humidity**

Room air is most pleasant with a relative air humidity of 50 – 60 %; it should be maintained between limits 40 % and 70 %. Room air which is too moist promotes germs, mould, cold bridging, rot and condensation (Fig. 6). The production of water vapour in human beings varies in accordance with the prevailing conditions and performs an important cooling function. Production increases with rising warmth of the room, particularly when the temperature goes above 37°C (blood temperature).
4. Harmful accumulation of Industrial gases

<table>
<thead>
<tr>
<th></th>
<th>Tolerable for Several Hours (%)</th>
<th>Tolerable for upto 1 h (%)</th>
<th>Immediately dangerous (%)</th>
<th>Temperature (°C)</th>
<th>Water content (g/m³)</th>
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</thead>
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<tr>
<td>Iodine Vapour</td>
<td>0.0005</td>
<td>0.003</td>
<td>0.05</td>
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5. Human expenditure of energy

<table>
<thead>
<tr>
<th>Activity</th>
<th>Energy Expenditure (kJ/h)</th>
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</thead>
<tbody>
<tr>
<td>At rest in bed (basal metabolic rate)</td>
<td>250</td>
</tr>
<tr>
<td>Sitting and writing</td>
<td>475</td>
</tr>
<tr>
<td>Dressing, washing, shaving</td>
<td>885</td>
</tr>
<tr>
<td>Walking at 5 km/h</td>
<td>2050</td>
</tr>
<tr>
<td>Climbing 5 cm stairs</td>
<td>2590</td>
</tr>
<tr>
<td>Running at 8 km/h</td>
<td>3550</td>
</tr>
<tr>
<td>Rowing at 33 strokes/min</td>
<td>4765</td>
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</tbody>
</table>

6. Room humidity

Maximum water content of one cubic metre of air (g)

**Note:** * mg per litre
1. Factors that affect thermal comfort

**Physical conditions**

- Air movement (draughts)
- Relative humidity
- Ambient surface temperature
- Air temperature
- Atmospheric charge
- Air composition and pressure
- Room occupancy
- Optical/acoustic influences
- Clothing

**Physiological conditions**

- Sex
- Age
- Ethnic influences
- Food intake
- Level of activity
- Adaptation and acclimatization
- Natural body rhythms
- State of health
- Psycho sociological factors
1. Heated walls

2. Heated walls

3. Field of comfort

4. Field of comfort

5. Field of comfort

6. Human heat flows
9. Humidity values for air we breathe

<table>
<thead>
<tr>
<th>Water content of the air (g/kg)</th>
<th>Suitability for breathing</th>
<th>Sensation</th>
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</thead>
<tbody>
<tr>
<td>0 – 5</td>
<td>Very good</td>
<td>Light, fresh</td>
</tr>
<tr>
<td>5 – 8</td>
<td>Good</td>
<td>Normal</td>
</tr>
<tr>
<td>8 – 10</td>
<td>Satisfactory</td>
<td>Still bearable</td>
</tr>
<tr>
<td>10 – 25</td>
<td>Increasingly bad</td>
<td>Heavy, muggy</td>
</tr>
<tr>
<td>Over 25</td>
<td>Becoming dangerous</td>
<td>Very humid</td>
</tr>
<tr>
<td>41</td>
<td>Water content of the air breathed out270C (100 %)</td>
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</tr>
<tr>
<td>Over 41</td>
<td>Water condenses in pulmonary alveoli</td>
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</tbody>
</table>
10. Comparative relative humidity values

<table>
<thead>
<tr>
<th>Absolute water content (g/kg)</th>
<th>Relative humidity (%)</th>
<th>Temperature (°C)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>50</td>
<td>0</td>
<td>Fine winter's day healthy climate for lungs</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>4</td>
<td>Fine autumnal day</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>18</td>
<td>Very good room climate</td>
</tr>
<tr>
<td>8</td>
<td>50</td>
<td>21</td>
<td>Good room climate</td>
</tr>
<tr>
<td>10</td>
<td>70</td>
<td>20</td>
<td>Room climate too humid</td>
</tr>
<tr>
<td>28</td>
<td>100</td>
<td>30</td>
<td>Tropical rain forest</td>
</tr>
</tbody>
</table>

**Temperature regulation and heat loss from the body**

The human body can raise or lower the rate at which it loses heat using several mechanisms: increasing blood circulation in the skin, increasing the blood circulation speed, vascular dilation and secreting sweat. When cold, the body uses muscular shivering to generate additional heat.

Heat is lost from the body in three main ways: conduction, convection and radiation. Conduction is the process of heat transfer from one surface when they are in contact (e.g. feet in contact with the floor). The rate of heat transfer depends on the surface area in contact, the temperature differential and the thermal conductivities of the materials involved. Copper, for example, has a high thermal conductivity while that of air is low making it a porous insulating material. Convection is the process of body heat being lost as the skin warms the surrounding air. This process is governed by the velocity of the circulating air in the room and the temperature differential between the clothed and unclothed areas of the body. Air circulation is also
driven by convection: air warms itself by contact with hot objects (e.g. radiators), rises, cools off on the ceiling and sinks again. As it circulates the air carries dust and floating particles with it. The quicker the heating medium flows (e.g. water in a radiator), the quicker is the development of circulation. All objects, including the human body, emit heat radiation in accordance to temperature difference between the body surface and that of the ambient area. It is proportional to the power of 4 of the body’s absolute temperature and therefore 16 times as high if the temperature doubles. The wavelength of the radiation also changes with temperature: the higher the surface temperature, the shorter the wavelength. Above 500°C, heat becomes visible as light. The radiation below this limit is called infrared/heart radiation. It radiates in all directions, penetrates the air without heating it, and is absorbed by (or reflected off) other solid bodies are warmed. This radiant heat absorption by the body (e.g. from tile stoves) is the most pleasant sensation for humans for physiological reasons and also the most healthy.

Other heat exchange mechanisms used by the human body are evaporation of moisture from the sweat glands and breathing. The body surface and vapour pressure differential between the skin and surrounding areas are key factors here.

**Recommendations for Internal climate**

An air temperature 20-24°C is comfortable both in summer and in winter. The surrounding surface areas should be differ by more than 2-3°C from the air temperature. A change in the air temperature can be compensated for by changing the surface temperature (e.g. with decreasing air temperature, increases the surface temperature). If there is too great a difference between the air and surface temperatures, excessive movement of air takes place. The main critical surfaces are those of the windows.

For comfort, heat conduction to the floor via the feet must be avoided (i.e. the floor temperature should be 17°C or more). The surface temperature of
the ceiling depends upon the height of the room. The temperature sensed by humans is somewhere near the average between room air temperature and that of surrounding surfaces.

It is important to control air movement and humidity as far as possible. The movement can be sensed as draughts and this has the effect of local cooling of the body. A relative air humidity of 40 – 50 % is comfortable. With a lower humidity (e.g. 30 %) dust particles are liable to fly around.

To maintain the quality of the air, controlled ventilation is ideal. The CO₂ content of the air must be replaced by oxygen. A CO₂ content of 0.10 % by volume should not be exceeded, and therefore in living rooms and bedrooms provide for two to three air changes per hour. The fresh air requirement of humans comes to about 32.0 m³/h so the air change in living rooms should be 0.4 – 0.8 times the room volume per person/h.

**THE EYE: PERCEPTION**

1. Black areas and objects appear smaller than those of the same size which are white: the same applies to parts of buildings

2. To make black and white areas look equal in size, the latter must be drawn smaller
3. These vertical rules are actually parallel but appear to converge because of the oblique hatching

4. Lengths a and b are equal as are A-F and F-D, but arrowheads and dissimilar surrounds make them appear different

5. Although both are equal in diameter, circle a looks larger when surrounded by circles that have a smaller relative size

6. Two identical people seem different in height if rules of perspective are not observed
7. The colour and pattern of clothing can change peoples appearance (a) thinner in black (black absorbs light); (b) more portly in white (white spreads light); (c) taller in vertical stripes; (d) broader in horizontal stripes; (e) taller and broader in checked patterns

8. Dynamic effect

9. Static effect
10. Vertical dimensions appear disproportionately more impressive to the eye than horizontal ones of the same size

11 – 14. The perception of scale is changed by the ratio of the window area to the remaining area of wall as well as by architectural articulation (i.e. vertical, horizontal or mixed – 10; glazing bars can contribute substantially to this
15 – 17. The positioning of windows, doors and furnishings can give a room different spatial appearances: 15. long and narrow; 16. Seems shorter with the bed across the rooms, or the table below the window; 17. With windows opposite the door and appropriate furniture, the room seems more wide than deep.

18. A structure can appear taller if viewed from above; there is a greater feeling of certainty when looking up.

19. The walls slanting suitably inward seem vertical; steps, cornices and friezes when bowed correctly upwards look horizontal.
**Interpretation**

The activity of the eye is divided into seeing and observing. Seeing first of all serves our physical safety but observing takes over where seeing finishes; it leads to enjoyment of the ‘pictures’ registered through seeing. One can differentiate between a still and a scanned picture by the way that the eye stays on an object or scans along it. The still picture is displayed in a segment of the area of a circle, whose diameter is the same as the distance of the eye from the object. Inside this field of view the objects appear to the eye ‘at a glance’ Fig. 3. The ideal still picture is displayed in balance. Balance is the first characteristic of architectural sense – the sense of balance or static sense – that underpins the sense of beauty we feel with regard to symmetrical, harmonious things and proportions or when we are faced with elements that are in balance.

Outside this framework, the eye receives its impressions by scanning the picture. The scanning eye works forward along the obstacles of resistance which it meets as it directs itself away from us in width or depth. Obstacles of the same or recurring distances are detected by the eye as a ‘beat’ or a ‘rhythm’, which has the same appeal as the sounds received by the ear from music. ‘Architecture is Frozen Music. This effect occurs even when regarding a still or scanned picture of an enclosed area Fig. 1 and 2.

A room whose top demarcation (the ceiling) we recognize in the still picture gives a feeling of security, but on the other hand in long rooms it gives a feeling of depression. With a high ceiling, which the eye can only recognize at first by scanning, the room appears free and sublime, provided that the distance between the walls, and hence the general proportions, are in harmony. Designers must be careful with this because the eye is susceptible to optical illusions
1. The perception of a low room is gained 'at a glance (i.e. still picture)

2. In higher rooms, the eyes must scan upwards (i.e. scan picture)

3. The human filed of vision (head still, moving the eyes only) is 54° horizontally, 27° upwards and 10° downwards

4. The filed of view of the normal fixed eye takes in a perimeter of 10 (approx. the areas of a thumbnail of an outstretched hand)
5. The eye can resolve detail within a perimeter of only 0'1' (the field of reading), thus limiting the distances at which objects and shapes can be distinguished accurately – 6.

6. To be readable at a distance of say 700 m the width w of the letters must be: > 7—x 0.000291 = 0.204; height h is usually 5 w; 5 x 0.204 = 1.020 m

7. As in the previous examples, the size of structural parts which are differentiable can be calculated using the viewing distance and trigonometry

8. Street widths play an important role in the level of detail which is perceived from ground level
9. Parts of buildings meant to be seen but sited above projections must be placed sufficiently high up.

**MAN AND COLOUR**

Colours have a power over humans. They can create feelings of well-being, unease, activity or passivity, for instance. Colouring in factories, offices or schools can enhance or reduce performance; in hospitals it can have appositive influence on patients’ health. This influence works indirectly through making rooms appear wider or narrower, thereby giving an impression of space, which promotes a feeling of restriction or freedom Fig. 5 to 7. It also works directly through the physical reactions or impulses evoked by the individual colours Fig. 2 and 3. The strongest impulse effect comes from orange; then follow yellow, red, green, and purple. The weakest impulse effect comes from blue, greenly blue and violet (i.e. cold and passive colours).

Strong impulse colours are suitable only for small areas in a room. Conversely, low impulse colours can be used for large areas. Warm colours have an active and stimulating effect, which in certain circumstances can be exciting. Cold colours have a passive effect – claming and spiritual. Green causes nervous tension. The effects produced by colour also depend on brightness and location.

Warm and bright colours viewed overhead have a spiritually stimulating effect; viewed from the side, a warming, drawing closer effect; and, seen below, a lightening, elevating effect.
Warm and dark colours viewed above are enclosing or dignified; seen from the side, embracing; and, seen below, suggest safe to grip and to tread on.

Cold and bright colours above brighten things up and are relaxing; from the side they seem to lead away; and, seen below, look smooth and stimulating for walking on.

Cold and dark colours are threatening when above; cold and sad from the side; and burdensome, dragging down, when below.

White is the colour of total purity, cleanliness and order. White plays a leading role in the colour design of rooms, breaking up and neutralizing other groups of colours, and thereby creates an invigorating brightness. As the colour of order, white is used as the characteristic surface for warehouses and storage places, for road lines and traffic markings.

1. Goethe’s natural colour circle: red blue yellow triangle ae basic colors (from which all colours can be mixed): green-orange-violet triangle shows colour mixtures of the first.
2. Bright and dark colours and their effect on humans.

3. Light and heavy colours (not the same as bright and dark colours [Fig.2]; create a 'heavy' feeling.

4. The colour circle's twelve segments
5. Dark colours make a room heavy: rooms seem to be lower, if ceilings are heavily coloured

![Diagram of a room with dark colours]

6. Bright colours give a lift: rooms seem higher with emphasis on walls and light ceilings

![Diagram of a room with bright colours]

7. Long rooms seem shorter if end cross walls stand out heavily

![Diagram of a long room with cross walls]
8. White as a dominant colour, e.g. in laboratories, factories etc.

9. Dark elements in front of a bright wall give a powerful effect

10. Bright elements in front of a dark background seem lighter, particularly when over-dimensional
Brightness of Surfaces

Values between theoretical white (100%) and absolute black (0 %)

<table>
<thead>
<tr>
<th>Material</th>
<th>Brightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>White paper</td>
<td>84</td>
</tr>
<tr>
<td>Chalky white</td>
<td>80</td>
</tr>
<tr>
<td>Citron yello</td>
<td>70</td>
</tr>
<tr>
<td>Ivory</td>
<td>approx. 70</td>
</tr>
<tr>
<td>Cream</td>
<td>approx. 70</td>
</tr>
<tr>
<td>Gold yellow, pure</td>
<td>60</td>
</tr>
<tr>
<td>Straw yellow</td>
<td>60</td>
</tr>
<tr>
<td>Light ochre</td>
<td>60</td>
</tr>
<tr>
<td>Pure chrome yellow</td>
<td>50</td>
</tr>
<tr>
<td>Pure orange</td>
<td>25-30</td>
</tr>
<tr>
<td>Light brown</td>
<td>approx. 25</td>
</tr>
<tr>
<td>Pure beige</td>
<td>approx. 25</td>
</tr>
<tr>
<td>Mid beige</td>
<td>approx. 15</td>
</tr>
<tr>
<td>Mid brown</td>
<td>approx. 40</td>
</tr>
<tr>
<td>Salmon pink</td>
<td>16</td>
</tr>
<tr>
<td>Full scarlet</td>
<td>10</td>
</tr>
<tr>
<td>Deep violet</td>
<td>approx. 5</td>
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<tr>
<td>Light blue</td>
<td>40-50</td>
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<tr>
<td>Deep sky blue</td>
<td>30</td>
</tr>
<tr>
<td>Turquoise blue, pure</td>
<td>15</td>
</tr>
<tr>
<td>Grass green</td>
<td>approx. 20</td>
</tr>
<tr>
<td>Limegreen, pastel</td>
<td>approx. 50</td>
</tr>
<tr>
<td>Silver grey</td>
<td>approx. 35</td>
</tr>
<tr>
<td>Grey lime plaster</td>
<td>approx. 42</td>
</tr>
<tr>
<td>Dry concrete, grey</td>
<td>approx. 32</td>
</tr>
<tr>
<td>Plywood</td>
<td>approx. 38</td>
</tr>
<tr>
<td>Yellow brick</td>
<td>approx. 32</td>
</tr>
<tr>
<td>Red brick</td>
<td>approx. 18</td>
</tr>
<tr>
<td>Darkclinker</td>
<td>10</td>
</tr>
<tr>
<td>Mide stone colour</td>
<td>35</td>
</tr>
<tr>
<td>Asphalt, dry</td>
<td>approx. 20</td>
</tr>
<tr>
<td>Asphalt, wet</td>
<td>approx. 5</td>
</tr>
<tr>
<td>Oak, dark</td>
<td>approx. 18</td>
</tr>
<tr>
<td>Oak, light</td>
<td>approx. 33</td>
</tr>
<tr>
<td>Walnut</td>
<td>approx. 18</td>
</tr>
<tr>
<td>Light spruce</td>
<td>approx. 50</td>
</tr>
<tr>
<td>Aluminium foil</td>
<td>83</td>
</tr>
<tr>
<td>Galvanized iron sheet</td>
<td>16</td>
</tr>
</tbody>
</table>

Floor-to-floor height:
30M - 300:19 = 15.8
select 16 steps
step rise:
h = 300 / 16 = 18.75 cm

Overall length:
15.26 = 416 cm
select 420 = 42 M
Tread going:
h = 419 / 16 = 26.2 cm
(assuming joint dimension of 1 cm)

Reinforced concrete staircase unit
Modular Systems

International agreements on the planning and execution of building work and for the design and manufacture of building components and semi-finished products are incorporated into national standards. The modular system is a means of coordinating the dimensions applicable to building work.

The term ‘coordination’ is the key, indicating that the modular layout involves an arrangement of dimensions and the spatial coordination of structural components. Therefore, the standards deal with geometrical and dimensional requirements. The modular system develops a method of design and construction which uses a coordinate system as a means of planning and executing building projects. A coordinate system is always related to specific objects.

Geometric considerations

By means of the system of coordinates, buildings and components are arranged and their exact positions and sizes specified. The nominal dimensions of components as well as the dimensions of joints and inter corrections can thereby be derived. [Fig. 1 – 6, 13]

A coordinate system consists of planes at right angles to each other, spaced according to the coordinate measurements. Depending on the system, the planes can be different in size and in all three dimensions.

As a rule, components are arranged in one dimension between parallel coordinate planes so that they fill up the coordinate dimension, including the allowance allocated to the joints and also taking the tolerances into account. Hence a component can be specified in one dimension in terms of its size and position. This is referred to as boundary reference. [Fig. 7 to 12]
In other cases, it can be advantageous not to arrange a component between two planes, but rather to make the central axis coincide with one plane, but rather to make the central axis coincide with one plane of the coordinate system. The component is initially specified in one dimension with reference to its axis, but in terms of position only [Fig. 7 to 2]

A coordinate system can be divided into sub-systems for difference component groups, e.g. load-bearing structure, component demarcating space, etc. [Fig. 8]

It has been established that individual components need not be modularized, e.g. individual steps on stairways, windows, doors, etc. [Fig. 14]

For non-modular components which run along or across the whole building, a so-called ‘non-modular’ zone can be introduced, which divides the coordinate system into two sub systems. The assumption is that the dimension of the component in the non-modular zone is already known at the time of setting out the coordinate system, since the non-modular zone can only have completely specified dimensions. [Fig. 9]

Further possible arrangements of non-modular components are the so-called centre position and edge position within modular zones. [Fig. 10 to 11]
Exactly what style of living room suits you best will depend on a number of factors, not least of which is whether it is to be for single, a couple’s or family use. Will you, or other member of the household, ever need to work there, or will the living room only ever be used for relaxing in, for reading, talking, listening to music perhaps, or watching television?

Pay particular attention, first of all, to making an interesting framework for the living room. Decorate the walls and windows with care, for even the best furniture and accessories will look poor against a shabby background. Generally speaking, colours should be result without being insipid, interesting but never frenetic.

When it comes to the style of a room, remember that while a room furnished all of a period rarely looks anything but dull, mixing a great many styles demands experience and a great sureness of taste. On a general level, a collection of contemporary art will look good in an otherwise antique room, and just one or two old things will make a vast difference to a roomful of modern furniture and contemporary fabrics.

The first rule here is to put practically before aesthetics. Even if you have no children or animals at the present time, it is always as well to plan a room bearing in mind future visits by one or other, or both together. And if you do have children, there is no reason why a stylish room cannot be evolved which will comfortably accommodate them as well as the adults. Just avoid using fragile furniture and accessories, and choose fabrics and carpeting that are easily cleaned.

The second rule is to be realistic, to plan a room that reflects, first of all, your needs, your tastes and your interests, but which, at the same time must be as comfortable and relaxing for guests as it is for you and your family.
**Living Room Furniture**

The choice and arrangement of furniture for a living room is, to a great extent, predetermined by the fact that the space will probably be used for a variety of activities. As well as general seating, therefore, you may also have to find room for a worktable or desk, and perhaps, a dining table.

For the young and impecunious, modular seating, which can be added to and moved around as necessary, makes a good start. Open armchairs, or occasional chairs with upholstered backs and seats, whether traditional or modern in style, don’t look bulky and are particularly useful for adding accents of colour in a monochromatic scheme. Fully upholstered sofas, day beds, chesterfields and so on are certainly more expensive and altogether more bulky.

A good general rule is to balance a sofa with two occasional chairs, or another sofa, set at right angles to it; aim to provide table surfaces with in easy reach of each seating place. A sturdy coffee table will not only accommodate all the usual family impedimenta, but can also be used for serving an occasional meal.

Whatever arrangement you choose, keep a sense of balance and proportion. Small-scale furniture in a small space, for instance, will make the area seem larger, where as a good-sized room can absorb bulkier items.

**Living Room Flooring**

If you have children, lead a fairly gregarious life, or cannot afford close carpeting, you might just as well have a plain wood or ceramic tiled floor, softened by area rugs. If, however You prefer carpeting, and even if you can afford the best quantity wool or wool and nylon mixture, remember that interestingly textured matting, sisal or wool cord is sometimes more effective. Where different textures or colours meet at doorways, the effect is neater if a threshold strip is inserted between the two. This will both protect the edges of the materials and dedicate the areas.
**A Specious Living Room**

City living rooms can look dark and drab by day. Especially in a built-up area, but any room with long windows and good natural light can be made to look bright. This particular room overlooking a garden square is so light and spacious it could be in the country. The first scheme, based on honeysuckle motifs, creates a warm, result effect; the second is based on clear, fondant colours, making the room bright and airy, and the third takes advantage of the space and nineteenth century detailing.
A High-Ceiling Room

Although huge soaring living spaces might seem an ideals situation to cramped apartment dwellers, the fact remains that too much space is as difficult to manipulate as too title. The answer generally lies in thoughtful arrangement and a clever use of colour. The scheme opposite has a cool, sophisticated look achieved with a distinguished use of monotones. The second tames the space with colour and pattern, while in the third, an indoor-outdoor effect is created using natural textures, plants and generously comfortable seating.
A Living Room with Period Detail

Small, square living rooms lend themselves to a variety of different colour schemes, arrangements and treatments which depend on taste and pocket. They have the advantage of not swallowing up too much furniture, although it if often difficult to decide, how best to arrange possession and seating in these confined spaces. The scheme opposite is simple and undemanding and takes the room’s natural assets as focal points. The scheme, right , uses mirror to prevent the space closing, in while the vivid colours of the upholstery in the third one make for a permanently summery effect.
**A Featureless Living Room**

So many modern apartment rooms are like featureless boxes with, perhaps, a large expanse of windows as their main asset. To give them some individuality therefore, they have to be injected with a style of their own—sometimes by a striking use of colour, pattern or texture, sometimes with accessories, more often than not with a mixture of both. In the scheme opposite, a western interior has been given an oriental feel with low, modular seating and translucent sliding blinds. The second scheme, while less extravagant in its use of colour, still maintains interest and has textures and pattern as the focus. The third scheme gives the room a summery look with sky blue, pinks and greens.

**A Small Square Living Room**

Old fashioned apartments can be given gleam and gloss as much by clever use of colour and texture as by furnishings. In this room, whose main assets are its large expanse of leaded glass window and ornate fireplace, the scheme opposite is all lavender and gray, spiked by the shiny chrome furniture and flowers. The second uses sunset colours for a year-round glow, and the third, with its updated wood paneling, uncarpeted floor and firm fabrics, achieves a cool, textured look.

**A Long Beamed Room**

Beams are such a dominant feature in any room, teaching to make the space seem long and row, that they need special treatment if they are not to overwhelm a space. In two of the three schemes, the beams are kept as an intrinsic decorative feature; in one they tone in with the background, while in the other, they from their own graphic design. In the third scheme, right, they have been paneled over, and the ceiling is kept pale to make the room seem light and airy. The lowered ceiling also allows lights to be recessed into the wood. This obviates too much interruption of the surface. And the geometric pattern of the carpet tends to make the space seem a good deal wider than it actually is.
**A Large Square Living Room**

Large rooms can be much more difficult to furnish and arrange satisfactorily than smaller areas. Informal, yet uncluttered, an easy grouping of modular seating against a pale background solves the problem in the scheme opposite; in the scheme right the spacious feeling is maintained with pale upholstery and a geometric carpet. In the scheme below, the fireplace and moldings are accentuated against a more traditional background colouring.

**A Living Room with a View**

Town houses and apartments often have rectangular living rooms which, failing interesting treatment can look plain and uninspired. Here, all three rooms take the unusual window as their focal point, but there the similarity ends. The scheme opposite is bleached and polished, allowing the foliage to dominate; the second has been turned into one large garden room, and the third has a definite Moorish theme.
A Long Narrow Living Room

The long narrow living areas which result from two rooms being knocked together limit variations in furniture arrangement. Since daylight seldom penetrates beyond the centre of this area, much of it is in perpetual twilight, but by clever use of colour and concealed lighting, it is possible to surreptitiously boost the ration of daylight. One scheme depends in a relaxed way on subtle colours; another turns the room into an extravaganza of red and exotic objects, and in the op art scheme, all illusion of space is created by using arches and mirrors.
A Studio Flat

City studio apartments which are basically one room, with sometimes, the additional bonus of a separate bedroom, are invariably exercises in ingenuity with three aims in mind: to make the anonymous space look as interesting, seem as large, and hold as much as possible. The room on this page has much the same features or lack of them as the room opposite: the same large window at one end; the same shape, the same lack of basic detail. Here, however, although the aims are similar, the treatments are totally different.
A Narrow Studio Flat

The schemes on this page have the same aims as those opposite to make the space seem as large and as interesting as possible. The first room is made crisp and pretty, simply by using clear cut colours and extensive mirror to maximize light and space. The strongly patterned vinyl floor and panels of wood and mirror give the scheme below a sturdy character where none existed before.
One Room Living

In this large, well organized space, sleeping, eating and work areas are kept separate. The bed, which is tucked away at the narrow end of the room, is partly screened by a workable, and there is another table which can also be used for work or eating; the living area is in the foreground. The light airy scheme opposite relies to a large extent on natural textures, with massive plants which act as room dividers. Bright colour coordinates the different areas, right, and in the scheme below, subtle unity is provided by understated variations of one colour.
**A Dine in Living Room**

As city space becomes increasingly rare, multi purpose rooms become correspondingly more necessary. By thoughtful planning, living rooms can be used for dinning as well as providing room for the occasional guest. Oblong rooms, often found in city apartments, lend themselves particularly well to just such treatment. The scheme opposite, with its eclectic use of prints and its eye catching carpet, looks fresh and unstudied; the garden scheme uses a trellised arch to separate the living and dining areas, and the third uses batik cotton to achieve a warm and mildly exotic effect.
**Living Room Lighting**

Plenty of general background light is obvious necessary and this should be boosted by task lighting and well controlled highlighting for interesting arrangements of plants, Paintings and objects.

Ultimately, the colours, and textures you use, the pieces of furniture you finally decide on, and what kind of accessories you amass, are very much a question of taste, and pocket. The varied rooms shown in this section cover a cross-section of ideas and styles and can be adopted and adapted to suit whatever type and size of space you have.

**BED ROOM**

The general consensus is that whether double or single, bedrooms should be restful rather than dramatic, capable of looking both warm and cool, depending on the season, and as personal as the occupants prefer. Many people consider comfort to be of key importance; for others, a certain spare ness and simplicity may be the chief requirement.

**Planning a Bedroom**

If the room is only to be used for sleeping, you will probably only need a bed and a system for storing clothes. On the other hand, if it is also to be used for relaxing or working in, you will need a space large enough for these activities.

An ideal main bedroom would be large enough to include a pair of comfortable chairs or a small sofa and there would also be room for an occasional table for books and magazines and perhaps, the odd meal.

Ideally, a guest bedroom should be both welcoming and comfortable, interesting without being too strongly personal. If space is available, include a capacious dressing table, which can double for a desk, as well as a comfortable chair and good lighting.

It is obviously foolish to buy furniture for small children’s rooms that will suit one age group admirably and be redundant the next, so look for sturdy pieces that will grow with the child. Fabrics should be tough enough to
withstand childish onslaughts, yet cheerful enough to stimulate and satisfy the most colour-conscious youngster. Flooring should be as sound proof and dirt resistant as it is possible to find.

Adolescents should have rooms of their own on which to impose their developing tastes. Let them choose the decoration and accessories for themselves as far as possible, or at least let them make some decisions in your presence. Their rooms should, if possible, include a bed, a worktable cum dressing table, at least one chair, shelves for books and other possessions, and good storage. If there is room, provide extra beds so they can entertain friends.

**Bedroom Storage**

A bed can be built in with storage to seem all of a piece, or if space is very confined; drawers can be fitted under or bought with the bed. Built-in closets and small dressers or lowboys can be used instead of bedside tables. If there is no room for a separate desk or worktable, a long top placed across a pair of low dressers will give adequate writing, sewing and make-up space, and room underneath for extra storage.

**THE FINAL TOUCHES**

Choice of curtains, covers, blinds and accessories will depend on taste, budget and the style of the room. Soft pile carpeting or at least one or two rugs by the side of each bed will provide an atmosphere of ease and comfort in a bedroom. The following pages show bedrooms of every style and description for every sort of situation. Most of the schemes can be adapted to suit different sized rooms.
TYPES OF BEDROOMS

A Bedroom / Dressing Room

Sometimes it is necessary to try and get more or less separate sleeping and dressing room areas out of one space. In this case, a half partition wall is raised between bed head and dressing space, leaving passage way either side so that the room, though effectively divided, still maintains its feeling of spaciousness. The scheme opposite is somberly distinguished, with gray flannel, mirror and excellent lighting. Another takes as it cue the wooded view outside the window for a fresh green and white effect. And the third is rather more sumptuous, with more silk walls, a delicate sweet, pea fabric and toning carpet border and accessories.
**A Large well-proportioned Bedroom**

Turn-of-the-century rooms, with their graceful windows and good proportions, can absorb quiet disparate pieces, and even if allowed to remain comparatively empty of furniture, they can still look interesting and sometimes memorable.

In the first scheme, the painted brass bed is a good vehicle for the chaste linen coverings; and in the second, the four poster with sheer calico hangings makes a pretty, all-white, room within a room. In complete contrast, the third scheme uses brightly coloured sheeting to transform the space into a warm, sophisticated area.
**A Rectangular Bedroom**

In most new blocks the bedrooms are often economically designed square or rectangular shapes with few natural assets except perhaps for the view, as in this room. To add internal interest, the scheme opposite depends on cleverly angled plat forming; the second is based on a whim; centered on the palm motif, and the third turns the space into a prettily traditional room.
A Large Bedroom / Sitting Room

Large bedrooms are often quite big enough for relaxed sitting as well. This one is enviable for its generous proportions, its windows and balcony and splendid city view. Indeed, the only problem is how scheme is calm but idiosyncratic; another is cool and chic; the third is parrot-coloured and bucolic, in direct contrast to the grays and browns of the view through the long windows.
**A Dark Bedroom**

Many houses and apartments contain dark, badly lit rooms which seem impossible to decorate with any sort of flair. But while the light may be poor, the windows are often of a good shape and size and can at least be used as focal points. Rich, warm colours are used in two of these schemes, while the light, fresh tones of the one below make the space seem lighter than it actually is.
**A Simple Bedroom**

Modern apartment buildings tend to contain anonymous rooms which have few, if any, architectural details or embellishments. Giving character to these spaces is a good exercise in cosmetic decoration; how best to use pattern, colour and accessories. This is well demonstrated in the scheme opposite, which depends on horizontal and diagonal lines in crisp, fresh colors to achieve a bright, airy effect. In another, the pastel shades of both walls and fabrics add warmth to the pale walls and floor as a backdrop for sculptural shapes.
A Guest Bedroom / Study

This is really bedroom—a good, airy space with an exceptionally high ceiling and long graceful windows: a country room, or a room in a large, old fashioned apartment block. The scheme opposite, with its lavish use of muslin, is soft and deliberately feminine: another is cool and tailored, with shiny floor tiles and a play of grays; the third has fruit and flowers as its central design motif.
A Tiny, Low Bedroom

The charm of narrow country cottage rooms with their sloping ceilings sometimes fades when it comes to fitting in furniture. A minimal, uncluttered approach is generally wisest. The scheme opposite imposes focus on the space by treating the window like a painting, the primary colour of the frame taken up and echoed elsewhere in the room. In the scheme below, a dimension is added to the room by the creation of a curtained alcove. The third scheme uses matching wallpaper and fabric to visually expand the space.
A Tiny, well-proportioned Bedroom

The height of a room has a considerable effect on the amount or furniture that will look good in the space. You can fit more for instance, into a well-proportioned, tiny room, like this one in a summer home, than in a similar sized area with a high ceiling. The room also had deep windows overlooking a harbour and nice, battered old pine doors and stutters. The first scheme takes every advantage of these natural assets, while in the second, rather more sophisticated approach, the space is tinged with colour and the view outside exaggerated by covering the window embrasures with mirrors.
**A Tiny, High-Ceiling Bedroom**

Small rooms with high ceiling may at first seem too cramped or badly proportioned either for any visual appeal or for real comfort. But even a tiny room can be given unexpected distinction by an interesting bed treatment to provide the focal point, plus minimal furniture and a good use of colour. The first scheme centres on the cheerful colours of a pretty stenciled bed set against a background of quiet wallpaper. In second, pale fabric is used lavishly all around the room, creating a softer, but no less interesting feet.

**A Teenagers Bedroom**

Most teenage rooms need to have sleeping, sitting and studying space and an area for listening to music and entertaining friends. There most, therefore, be some subtle, or not so subtle division, so the space does not look too cluttered, and some attempt at soundproofing so that noise does not permeate the house. The scheme opposite is dominated by the super graphics in the living part of the room; in another, the division is intensified by textural contrasts and crisp lines, and in the third, the paper in the sleeping part is contrasted with a solid colour to break up the areas.

**A Child’s Bedroom**

Small children’s rooms need both practical furniture that will see them through several stages of development and an adaptable treatment to suit their developing tastes. Colour is among the most important elements to consider, and interesting schemes can easily be achieved with a paintbrush, paper cut-outs, and a little imagination. For younger children, vividly coloured, yet robust furniture combined with bold decoration is ideal. The first two schemes are based on fantasy and use bright colours to great effect. The scheme below with bunk beds is suitable for slightly older children.
BATHROOMS

Clearly, the prime purpose of a bathroom is to able to wash, bathing and shower in comfort. But, whether this means the room should be clean-looking and functional or luxurious and relaxing depends on personal taste. A simple, well, lit, clean-cut tiled or wood –lined spaced suits one sort of person; a carpeted lounging spaced, possibly an extension of a bedroom, is the luxurious ideal of another.

Planning a bathroom

If you are starting to plan a bathroom from starch, or going to make major changes in an existing room, the layout needs a good deal of thought, especially if the room is to be shared be several people of different generations. Given adequate space, you will probably want to include a bathtub and /or shower; a washbasin; a toilet, if it is not separate; a bidet; a well-lit mirror; storage; at least one chair or stool; a towel rail, preferably heated; practical flooring, such as tilling or water-resistant carpet; and a generous splash back area. You may well also plan to use the bathroom for laundry, in which case a space for washing machine should also be considered.

Whatever the arrangement of equipment chosen, you should bear in mind the occasions when more than one person wants to use the bathroom at the same time. If there is space, there is no reason why you should not put in two basins (if they are side by side, they can share a large mirror) and two cupboards or cabinets.

Bathtubs come in many sizes and shapes, so it is worth shopping around to find the one that suits you best. Sunken baths can look dramatic and have a luxurious feel, but they are relatively expensive to install. Whirlpool baths or Jacuzzis are also becoming increasingly popular. They, too, are available in a wide number of sizes, shaped and colours and give a body a soothing massage with underwater jets. A-free-standing tub looks good if the bathroom is really large. It could either be installed in the middle of the room or perhaps raised up on a platform. Or it could be centred against one
wall with units or shelves built either side, an arrangement which allows for interesting treatments with shower curtains.

**Improving an existing bathroom**

Even if you cannot afford new plumbing or radical rearrangement of fittings, it is quite possible to transform the smallest, dreariest, most badly planned space into a cheerful place of relaxation, for it is usually fairly easy to treat a bathroom cosmetically, that is by purely decorative means.

On the simplest level appropriately coloured towels and shower curtains can improve a room that is totally tiled or laminated in an uninspiring colour. A small, all-white bathroom can be given a totally different feel by massing it with plants. While a dark room can be enlivened with a contrasting trim and brightly coloured towels. The trick is to take the base colour and make it look more vibrant by spicing it up with sharper accent colours. Pastel-coloured fittings are enlivened by bolder, richer tones of the base tone for towels, bathmats or facecloths. Tiles can be given a new looking by painting them a more pleasing shade with a special tile or deck paint. Plain walls (even plastic–laminated ones) can be painted a warm, dark colour and massed with prints, photographs, paintings, or china.

To make an immediate transformation, waterproof wallpaper can be used on ceilings, pasted on bathtub panels, and taken over flush doors and secured by beading. Paper that is not already waterproofed can be over-painted with a clear lacquer or varnish. To make a space seem more luxurious, carpet or wood paneling is ideal for covering the side of bathtub or under-basin cupboards.

**Storage in the bathroom**

Open shelves can be stashed with neatly folded towels in good colors for decorative effect, or filled with collectibles for interest. Bathrooms used by children should definitely have extra storage space squeezed in, wherever practical, or the room will be in perpetual disorder. In a largish area, washbasins look better and are more practical, surrounded by a vanity unit with storage space underneath.
**Lighting in the bathroom**

While small rooms probably only need a central ceiling light, down lights are effective in bathrooms, whatever the size, and one over the bath is worth considering. Good lighting for shaving and make-up is best provided by light at the sides or around the mirror rather than just above, but it should be backed by good general light.

Aim to avoid the problems caused by condensation by steady warmth and good ventilation. If a heated towel rail or radiator does not seem enough to heat the room, extra warmth can be provided with a wall-mounted fan or infrared heater.

**THE FINAL TOUCHES**

If your bathroom is overlooked, there are a number of alternatives to ugly, opaque glass in window. Tightly stretched voile screens between narrow rods or wires can be fitted to the frame, or fabric roller or Venetian blinds can be used to filter light and block out the view. Another alternative would be to fix glass shelves across the window frame and fill them with plants, or plants interspersed with collections of bric a brac. The walls can be massed with pictures and prints, collected absurdities or words of advice, for humour in decoration add that extras levity that makes a room memorable. Long windows in a bathroom can be hung with curtains and, perhaps, blinds as well. Use a practical fiber like toweling if the windows are near the bath or shower, ordinary cotton or some lightweight material, if not. Over the following 18 pages we give a variety of different schemes which can be adapted for bath rooms of all types and sizes to give some idea of the potential for decorating these spaces. None of these involves structural alterations or vast expense, but all succeed in modifying or transforming the existing rooms to a greater or lesser extent.
TYPES OF BATHROOMS

A Square bathroom

It is usually possible to decorate smallish bathrooms like this one without resort to structural alteration or enormous expense. In the scheme opposite, for example, indoor plants repeat the colour of the carpet, and the collection of pictures echoes the lines of the bare window panes; the overall effect is simple and restful, yet effective. In the coordinated scheme, to the right, patterned walls are teamed with a bright carpet and matching window blind. The brightly coloured mosaic which dominates the scheme below is used to add a touch of grandeur to the small space.
A Long bathroom

A narrow room with a window at one end may tend to look tunnel-like—especially a bathroom, where equipment is standard and necessarily difficult to move around unless decorated expressly to avoid this pitfall. In the room opposite, mirrors and striking tiles are used to visually expand the width. Another scheme uses geometric wallpaper and coordinating carpet, again to seemingly push out the walls as much as possible. And in the third, the eye is distracted from the general feeling of narrowness by edging plain paint with a border and adding a collection of pictures.
**A Large Period bathroom**

Most turn-of-the-century bathroom were really converted bedrooms space invariably came second to the novelty of a working bath with running water. Today, the reverse is true and generous space is more of luxury than the actual equipment. One design uses the sort of unpretentious furnishings that suit the young and impecunious; the second uses Edwardian colours and mahogany for an altogether more grand effect, while in the third scheme, the design on the bath is used as a base on which to built-up the background colours.
**A Small Square bathroom**

Bathroom in the apartment buildings are usually far from large, and very little can be done to alter their structure without incurring enormous expense. The only way to improve these spaces is cosmetically in general, there is little scope for change except in the ceiling and untiled areas of wall. This scheme uses coordinating paper and border to offset the hygienic effect of the white tiles. In the one below tongue-and-groove boarding and tiles create a neat, efficient space.
**A Small Rectangular bathroom**

This room is very similar in size and shape to the bathroom opposite. The strength of these small spaces is that they are usually inexpensive to redecorate: a little of anything goes a long way; their weakness is that they can easily look dreary and bedraggled. With its simple ingredients and minimal colour, the first scheme manages to make the room look both gentle and glamorous; the one below expands the space into a kind of summer terrace, with clever use of mirror, wood and plants.
**A Bathroom / Dressing Room**

The main problem with this practical bathroom cum dressing area was how to fit in plenty of storage while still keeping a sense of light and space. In the scheme opposite, in which the colours were kept fresh and light, the solution was a full-length cupboard one end of the bathtub. A more tailored, masculine scheme has matching cupboards both ends of the bath, while the scheme below is altogether softer and more feminine in effect, with its looped back curtains emphasized by the mirrored wall at the back of the bath.

**A Bathroom under roof**

Bathrooms often have to be fitted into the most awkward spaces and this cramped room with its sloping ceiling is no exception. The general feeling of pokiness is disguised well in each of the three schemes. One is a strong, two-colour scheme which uses tongue-and-groove boarding for the panel of the bath as well as most of walls; another fills the room with colour by painting bold rainbow strips on the walls, ceiling and bathtub. The third uses mylar wallpaper to make the space seem larger as well as to give it a certain dash of character.

**A Bathroom on a landing**

In old apartment blocks and buildings, bathrooms are often fitted wherever they can be squeezed. Here, there is just room to fit a bathtub under the fine arched window with not a millimeter to spare. The scheme opposite achieves casual elegance, while the paneled scheme, right, takes advantages of the window with a dramatic, plant-strung background for the bath. Painted glass is substituted for plain in the one below, to make the most of the window with out loss of privacy.

**A Tiled bathroom**

Even if the walls of a bathroom are extensively tiled, there are still ways of altering the look of the space. Quite reasonable changes can be effected by adding or changing the casing of the both or basin; by replacing the floor covering and re-colouring and tiled areas with special paint; and by
choosing different accessories. These three schemes illustrate how, despite the apparent lack of scope, comparatively inexpensive alterations can completely change the look of a bathroom.

**A Shower room**

For those who prefer a straightforward shower, one major factor governs the choice of decoration; the space must be well waterproofed if the surrounding areas are to remain reasonably dry. This shower room opens off a bedroom and the WC and basin in two of the schemes are trucked away behind a sliding door, designed to match the back of the shower itself. All three schemes aim to be practical and yet pleasing to the eye. The one opposite uses tiles and wood for visual interest; another aims for a more glamorous look with mosaic tiles and mirrors, while the scheme below, with its simple, contrasting colours, is clean looking and timeless.

**DINNING ROOMS**

Rooms used for the sole purpose of dining are getting rarer and rarer. Instead people increasingly have living-dining rooms, kitchen-dining rooms; they have dining areas in the hall or the guest room. All are moderately easy to furnish since it is only necessary to fit a table and chairs which don’t usually interfere with the other purpose of the room.

**Planning a Dining Room**

If you do have a proper dining room it is easier to decorate if you bear in mind that its main purpose is to provide an area for relaxed and enjoyable eating. This is an obvious, but nevertheless important point, for dining rooms have a woeful habit of looking formal and often stereotyped, as if eating was a duty rather than a pleasure. Colours, then should be chosen as a background for the food, the china and glass. Dark rich colours are particularly successful, therefore, although more vivid colours can also look handsome.

Wherever you end up eating, what table you choose depends very much on the shape of the area. Round tables are usually more sociable and hold
more people in less space. They can double up for use in a living room, study, or even guest bed room. If you have a very narrow room, you could try placing a long table set up against a mirrored wall seemingly doubles in size.

It is often difficult to find just the right round table. One good solution is to fix a circle of block board, cut to the right size, to a base of the right height, which can then be covered permanently with a floor-length cloth. You can change the look of it with the help of a series of different over cloths. The same principle of improvisation also applies when it comes to enlarging any table if you have the room to store a spare top. Remember that any money saved on such makeshift tables can be spent on better chairs, especially if you have a room solely for dining in.

On the whole, carpets are not a good idea in any dining area, particularly if you have children. Food gets dropped, drinks get spilled, candles leak melted wax. It is easier to have some surface that is easily cleanable and which will stand the strain of chairs being scraped back and forth. If your dining table is in part of the living room, you could position it on a rug which can always be cleaned more easily than an entire carpet. On the whole, though, more practical surfaces for a dining room floor would be stripped and polished boards, or ceramic, vinyl or cork tiles, all of which can be easily wiped or swept clean.

**Storage in the Dining Room**

Nowadays, few people have the spaces for a conventional sideboard. Many store glass and china in the kitchen or in built in storage units in the living or dining room itself. Make sure that any surface you serve from is heat-resistant; if it isn’t protect it with a mat.
A Small Square Dining Room

Old country houses are often full of small square rooms leading from one to another. The problem is how to make them look as personal and idiosyncratic as possible without cluttering them up or being too clichéd. In the scheme opposite the ingredients are traditional, but interestingly arranged so that the room is a series of small vignettes. In the second, a patterned fabric wall covering makes the room seem fresh and bright, while in the scheme below, a wash of colour on the walls, striped cotton on the table, different chairs, accessories and plants make the room seem warm and comfortable.
A Square Dining Room

Rooms with distinctive characteristics (this one has long beams and a shallow window down one side) pose their own problems when it comes to redecoration. One solution is to focus on the distinguishing features themselves. The scheme opposite is kept very simple: a basically white space with a strongly patterned end wall. But the two rooms on this page alter the mood radically, one with graphic use or colour which effectively emphasize the beams, and the other which uses a gamut of soft rose tones for a much more traditional feeling.
**A Rectangular Dining Room**

The problem here is how to give interest to the sort of characterless room which is often of difficult to furnish without monotony. In the scheme opposite, the room has been given a rustic feel, with brick walls and floor and old pine furniture. The scheme below is much more sophisticated and soigné, with soft, dark walls, an interesting floor, and a polished round table. In the third scheme, the room has been made a base for some splendid early furniture and portraits-although any interesting furniture would look good with this quiet background and subtle lighting.
A Narrow Low-Ceiling Room

Lack of space in this room is further compounded by a low ceiling and the fact that one wall is entirely taken up by window. In the scheme opposite, the theme is uncompromisingly 20th century with almost de rigueur contemporary prints on the wall. Another plays on reds so effectively that it entirely distracts from constrictions of the area. And in the scheme below, a much more traditional feel is achieved, with painted paneling, polished floorboards and period furniture.
A Bed Room / Dining Room

The problem of fitting sleeping, sitting and eating space into one small area is a perennial one. This room is particularly small and so long and narrow that without care, the space could look hopelessly jumbled, in the scheme opposite, the section at the end of the room containing the bed can be screened off when not in use. In the second scheme, the walls are softened with fabric to distract the eye from the lack of space, and in the third, mirror is used extensively to push out the walls.
KITCHEN

Kitchens are probably the most complicated rooms of all to plan, varying in function as they do from straight preparation, cooking, washing up and dining areas to general family rooms. Small spaces, force majeure, come in to the first category; large kitchens tend to fall into the second. For must people, the decision about how actually to use the room is dictated by the existing design: equipment, once built in is difficult, and certainly expansive, to shirt. But even if you are moving into a house or apartment in which the kitchen is already planned and full of equipment, you can still imprint your own personality on the area by changing the colour of walls, by altering window treatments, by adding accessories, and, if you can afford it by, replacing counter tops and floor coverings or finishes.

Planning a Kitchen

If you are planning the room from the beginning and are not quite sure what equipment you will nee, or what style of kitchen you prefer, these questions will help rationalize your thoughts on the subject: what kind of meals are you likely to cook, for how many, and how often? Will you present situation remain static as far as you can tell or will the family expand? Is the kitchen solely for meal preparation and is not all, of the time? Do you work all day, or live far from stores so that you need more than the average amount of storage space? Are you happier with a warm country feeling, natural textures and everyday functional objects on open display, or do you prefer easy care surfaces and enclosed storage? Or do you like a judicious mixture of both?

Ideally, the layout of a kitchen should follow a work programme based on a logical sequence of operations, so think about usual working routine. Give each task its own special area. Cooking usually involves a good deal of doubling back to and from the refrigerator, sink, stove and different preparation areas. Each one needs careful planning so that all necessary equipment and food stuffs are at hand. Try to plan for a work surface next to each appliance: so the sequence goes work surface then sink, work
surface than stove, work surface, and so on. You should allow a minimum or three feet (915mm) for each preparation area, and for dirty washing up; allow two and a half feet (762mm) for draining clean crockery if you do not have a dishwasher; set aside two feet (610mm) by the stove for dishing up and serving food, one and a quarter feet (381mm) of free work area beside the refrigerator. the cook top should be no more than six feet (1m 829mm) from the sink, and the passage width between fixtures at least four feet (1m219mm). If you live alone, you can usually make do with one foot (305mm) less room.

Kitchen walls generally take quite a battering, so they should be painted in washed semi-gloss or gloss paint. Or they can be covered in a vinyl or washable blinds.

Kitchen floors also have to withstand a great deal of wear and tear and should be though, waterproof, grease-alkali-and acid-rejecting, and easy on the feet. Vinyl (whether in sheet or tile from) and vinyl –covered cork meet most of these conditions and area easy maintain. Terracotta, tiles, brick, flagstone, slate, terrazzo and non-slip ceramic tiles are all durable, impressive and good to look at, but they are inclined to be expensive. They are also heavy and are therefore probably only suitable for use at ground – floor level or where floors are particularly strong.

Whether you choose to store all the paraphernalia of cooking hidden behind closed doors or prefer to have things out on display is a matter of taste. Some cooks like to have things with in easy reach- pots and pans hanging from rails or butcher hooks; implements or ingredients on pegboard or metal grilles; plates, cups and saucers on open shelves other like the streamlined clean-cut appearance of conventional kitchen units.

Two types of lighting are useful in kitchens: general area light preferably controlled on a dimmer switch and specific task light over work surfaces and tables. Spotlights on tracks, down lights and wall washers make good background light, or general diffusing lights can be fixed to the ceiling. Fluorescent strips are always useful, concealed behind pelmets, under wall
storage units, they shine light onto the work surface below, and strips can be fitted inside onto the light up automatically when the doors are opened.

The next few pages show a variety of kitchen styles for every shape and style of room, most of which can be adapted to suit most rooms. But whatever style you eventually decide upon, remember that first and foremost, it is a space for the preparation of food, the more the background serves to encourage and enhance this task, the better.

**A Large Kitchen / Dining Room**

Large kitchen dining rooms seem an ideal but it is important to have plenty of dumping space if the detritus of cooking is not to interface with the pleasure of eating. In the scheme opposite, tiled walls and simple units make an inconspicuous background for the focal points of long refectory table and pots, pans and baskets hanging from the ceiling beams. The scheme on the right has a striking checkerboard theme, and in the third, neat matchstick blinds attached to beams can hide left-over cooking preparations.

**A Narrow Kitchen / Dining Room**

At first glance, this room seems to have a lot in common with the kitchen-dining area opposite, but the likeness is fairly superficial, since this space resembles a shoebox in proportion, while the other is generously wide. Natural assets such as plenty of light and greenery are used to distract from any narrowness in the first scheme, while in the below, every effort has been made to expand the space visually using most of the tricks of the trade (except expensive mirror).
**A Small Kitchen**

Windows set right up to one wall (often as a result of remodeling an old building) can look awkward. One way of overcoming this problem in a kitchen is to install slick, built-in units to restore the balances, as in the scheme opposite. Or the whole feeling of the space can be changed with clever use of colour and pattern, as in the second scheme so that any awkwardness is lost in the general design. The third scheme uses a sympathetic arrangement of collectibles and gently patterned fabric to distract from the less sympathetic proportions.
A Rectangular Kitchen

Faced with the problem of making a kitchen out of a rectangular room with one high window and sloping ceiling, what are the alternatives? If the space is big enough for eating in, it should obviously be treated with maximum imagination to make it both aesthetically and practically viable. The odd proportions of the space merge into the general whiteness of the scheme opposite and any colour stands out with intensity. In the third, dark shiny paint and butcher block tops give their own solidity and distinction to the space.
A Spacious Kitchen

One wall that is really all windows might sound ideal for a large family kitchen, but it does curtain preparation and storage space. This problem has been accepted in the scheme opposite, and the room treated as a good, old fashioned kitchen-family room with preparation and work counter kept to one end of the room. The scheme below is much more of a working kitchen and part of the generous window space is scarified for more storage and preparation space including an island unit. In the scheme, right, the area is much more streamlined, but allows for eating space as well as providing ample work tops.
**A Wide Kitchen / Dining Room**

A kitchen-dining room with a useful arched division like this one is a natural for the sort of comfortable, rustic feel achieved in the first scheme. But this space can equally well be given quite different, urban feelings as proved in the scheme below. Here, the combination of practical hi-tech components and everyday utensils chosen especially for their colours, makes for an interesting room with very define panache.

**A Roof-Top Kitchen**

Penthouses, which often have vast expanses of glass, present their own, very particular problems. The glass ceiling in this roof-top kitchen, for example, is both its main asset and main liability: the sun can beat down as fiercely in the summer as the rain and snow in winter; slides open the glass and city grime settles mercilessly. The scheme opposite plays it cool, filtering the elements with a diagonally –striped cotton blind which also visually expands the width. The scheme below with its trellis of plants treats the space like a proper greenhouse, while the third uses bright colours so that whatever the weather outside, the effect indoors is always bright and welcoming.

**An Open-Plan Kitchen**

One of the more rewarding urban legacies of the late twentieth century must be the restoration of the upper floors of old commercial buildings for residential use. The decoration of such areas must be planned to cope with and divide up abundant space, without destroying the impact of natural details like wood floors, beams and nature plasterwork. Cooking, sitting, dining, working and sleeping areas are easily combined in this room with no tangible barriers. The first scheme exploits spare, high-top components in a modern, but nonetheless warm treatment. The second divides up the space in a similar way, but uses built-in-units to blur the edges and create a softer overall effect, while in the third; the area is transformed to resemble a country farmhouse by extensive use of wood and natural accessories like herbs and plants.
A Small Island Kitchen

Restricted kitchen space is certainly not atypical in modern houses or apartments, so it is all the more important to be able to fit in the basic equipment. To save on the cook’s energy, as well as decoration costs, the layout of this rectangular kitchen is planned around a peninsular unit of food preparation, cooking and eating, leaving a U-shaped walkway. The room is well lit, with windows on two walls for natural light, built-in overhead lighting and a range lit by a concealed spot under the ventilating hood. It is still possible to produce very different effects with decoration without going to the expanse of changing the pine island unit. The three treatments given here are natural, French provincial and warm-toned.

A Large Island Kitchen

Generous window space, though good for natural light, can actually be rather a nuisance if a lot of storage space is required. In the room opposite which could be in town or country, storage units are built right round the glass so that the window becomes an integral part of this pleasing, practical arrangement of white paint and natural wood with two-toned hexagonal tiles. In the scheme, right, rich, plum-coloured walls and units are teamed with aluminium tiles and a dark slate floor for a much slicker look. In the scheme below, the space is made more traditional in appearance by the use of dark wooden units and café curtains at the window.

A Galley Kitchen

When the scheme is particularly small it is important to make it as appealing as possible and, of course, as functional. This room still manages to include all the amenities of a working kitchen without any sense of crowding. Horizontal beams across the ceiling in the scheme, right, a streamlined effect is achieved with industrial wire shelving, butcher-block worktops; galvanized sheet metal splash backs help exaggerate the width almost as much as mirror. All sense of boundaries is lost in the scheme below, in which walls, ceiling and units are all covered in the same dark,
glossy paint. Against such a background, kitchen accessories and any other colours stand out with great intensity.

**A Small Irregular-Shaped Kitchen**

Small apartments which are carved out of old houses and apartment buildings built for a more spacious age, often contain awkwardly-shaped rooms with cramped space and difficult angels. The major priority in decorating is to make those angles work, in whatever way is the most practical, without at the same time losing valuable floor area. The scheme opposite is purely cosmetic, almost emphasizing the angular character of the space and taking advantage of the greenery beyond the window. The second effectively loses the irregularity by clever use of colour, and the third relies on the collection of kitchen accessories to distract the eye from the shape of the room.

**LANDSCAPING**

**SPACE**

Landscaping concentrates on special design, a sound conception of space is necessary. Activities such as construction, agriculture and horticulture involve defining space for human use. Erecting a fence and construction of bunds are intended to define space. Likewise, a building or a room therein encloses and defines space (Fig. 1). Architects design space for human use in a variety of ways by adopting construction techniques. The materials used by them will consist of steel, bricks and mortar. In landscape gardening also, the aim is to define space for human use including recreation and relaxation. The basic materials used here are plants, water and rocks. In grouping them in simulated landscapes, beauty will be combined with utility.

**LAND**

In the discussion on space, the importance of land has been indicated. Land is the solid crust of the earth. It is surface on which the landscape
designs are executed. Therefore, it requires added consideration to understand bring out its importance to the designer.

In a manner of speaking, land may include the soil, rocks, water resources, vegetation, minerals and anything else that may stand upon it. For purposes of design, it is considered in terms of topography and soil. The physical characteristics and conspicuous surface features of land make possible its classification into landforms as plains, plateau, hills and mountains. Plains have very little altitude and slope. The land here is level. Most part of peninsular India lies in the plains.

![Diagram of a house and landscape garden](image)

**Fig. 1:** A house defines space by its roof, walls and floor. The landscape garden has also its roof, walls and floor.

A plateau is an elevated land. The two plateaus in the subcontinent are the Tibetan and Deccan plateaus. The Tibetan plateau lies at an altitude of 2600 m and the Deccan plateau 1000-1300 m above the sea level. It has little slope. Mountains and hills are rugged land with very little level surface. The difference between mountain and hill is a question of degree.
Mountain is generally rugged, the peaks and cliffs are very high. In hills, they are on a low scale. Much of rugged lands in south India are constituted by the mountain ranges of the Western Ghats and to a smaller extent the Eastern Ghats.

Fig. 2: The Mountain – 1. the ridge, 2. the peak, 3. the valley, 4. the floor of the valley, 5. the stream, 6. the shola. The outline of valley in cross-section. Man-made valleys should have smooth curves.

The hill or mountain has a ridge at the crest (Fig. 2). This ridge may be wide enough for land use or it may be very narrow and wind-affected. Most of the mountain ridges are rocky. This feature makes it impossible to have large vegetation forms such as trees. However, the ancient Hindus knew the aesthetic potential of flat ridges. The hilltop temple at palani is an example of such use. In some cases, the hill takes a conical shape, the apex of which almost tapers to a point, with no land at the top. To large extent, the land in the hill lies in its valley. A valley is a sloping land, hemmed in by rising mountains. The slope is measured in terms of ascent made for a known
distance of slope. Thus 1 in 10 is one foot (30.48 cm) of climb for every 10 feel; 1 in 25 is 1 foot of climb for every 25 feet. This can be expressed in percentage also. A slope of 1 in 10 will make 10 percent, 1 in 25, is 4 percent.

The floor of the valley will normally carry the stream, perennial or seasonal. It is the moistest region in the hill country. The bed bordering the stream is most likely to have deep fertile soils which can support lush vegetation. Within a major landform, there are possibilities for considerable variation in regard to topography, resulting in micro-landforms. This should also be taken into consideration while assessing landforms.

**Shaping Land**

Land in any situation will require shaping as a prelude to planting. The shaping operation essentially consists of excavation and filling. In the hill areas, these are done with view to obtain level surfaces for beds, lawns and buildings. In level country also shaping land is necessary to form ponds, mounds and drains. Hill gardens permit planting at various levels which add to their graphic beauty. Generally speaking, a flat piece of land is featureless, and one with natural slopes is distinctive in character and pleasing to the eye, comparable to the undulating lines made by a danseuse. In preparing rolling lands, both concave and convex surfaces are created. In an imaginary cross-section of these surfaces, the curve formed should be smooth. In actual practice, visual alignment is sufficient to form the desired curves in a landscape garden, though to treat large areas the aid of leveling instruments is essential.

The statement at the beginning indicates that an important concern in organizing space with grouped plants (as well as rock and water) is aesthetics. This necessitates a close examination of the term and the concept behind it.
AESTHETICS

Aesthetics has its origin in the Greek word ‘Aisthetikos’ originally suggesting sense perception. The perceptive senses are sight, smell, hearing, taste and touch. To the early Greeks, it meant perception of goodness, beauty and character. In the final stages of evolution of this word, its meaning, however, is restricted to perception of beauty alone. The Hindu concept of ‘Rasa-asvadana’ or aesthetic theory as applied to art would also mean the same.

The components of beauty of landscape are colour, shape, texture, pattern, line and point. These are chiefly concerned with visual perception and appreciation. The beauty of sound, movement and smell play an important though subsidiary role. Enchanting movements are appreciated by the eye, sound is a subject of auditory perception and the beauty of the scent enjoyed through the olfactory sense. Perception of beauty by individuals is highly subjective. Age, sex, culture aesthetic values among the peoples, both ancient and modern.

The national characters of landscaping have been influenced by culture and civilization of people. It is true to say that the style of landscaping reflects the ethos of the people.

BEAUTY COMPONENTS

Colour

The visual sensation produced by rays of decomposed light is colour. The light decomposing to a spectrum gives violet, indigo, blue, green, yellow, orange and red (VIBGYOR – Fig. 3). White is total effect produced by rays of unrecompensed light and black is the absence of light or the effect produced by a surface reflecting no rays. Blue, yellow and red are primary colours, all others having been derived from them serving as mixtures. Thus, blue and yellow combine to form green, yellow and red to form orange and red and
blue to form violet. Green, orange and violet so formed are secondary colours. The intermediate colours are formed by admixtures of two colours in the spectrum, such as bluish green and reddish yellow.

**Fig. 3:** The colour wheel: violet, blue, green, yellow, orange and red. Blue, yellow and red are primary colours. Violet, green and orange are secondary colours.

The quality of every one of these primary, secondary and intermediate colours is referred to as hue. If to a certain hue white is gradually added, progressive tints of it are formed by dilution. Instead, addition of black results in shades, indicating its depth. Addition of grey, which is black and white in equal proportion, causes the formation of tones of the particular hue. When the surface reflecting the colour allows light rays to pass through partially, it is translucent. It is called opaque when the surface does not show this property. Red, yellow and orange are referred to as hot or bright while green, blue and white are cool and light colours. Sometimes, colours are identified by their association with well-known objects and phenomena, as sky blue, marine blue, lemon yellow and emerald green. Natural sky blue, terracotta, beige and jungle green are referred to as earth colours. These are important in a design as background foil to more showy ones used as design elements.

Colour is an important component in landscape design. The predominant colour in nature, of which designed landscape is an imitation, is green. The
green is a cool, soothing colour. The green is a cool, soothing colour. The green colour of plants is due to a pigment called chlorophyll. It plays an important role in photosynthesis, the process of manufacture of carbohydrates in leaf cells from the simple elements, carbon, hydrogen and oxygen. The intensity of green colour is not uniform in all plants. In some cases it is very dark green and in others a light green. There is also a difference between young and mature leaves. In many species like *Madhuca longifolia*, the tender leaves are shining copper which gradually become chlorophyllous the maturity. Even though the brilliant autumn colours of temperate trees are not exhibited by tropical trees, there are a few species which show warm colours in older leaves. Threes belonging to the genus *Terminalia* show bright red foliage colour during the short deciduous period. Another phenomenon is variegated leaves in trees and shrubs. The trees show areas of white, yellow, red and many other colours and combinations in beautiful patterns. *Codiaeum, Achalypha* and *Aphelandra* are some of the genera exhibiting beautiful combinations of leaf pigments. Plants owe these colours to anthocyanins and xanthophylls.

The major contribution of colour in landscape design is by flowers. The floral colours are more appealing than man-made ones. The range of colours obtained in flowers is very vast. Black colour is absent in flowers. The ‘eyes’ in petals of Hibiscus and such others, is a shade of blue rather than black. Green flowers are common in Annonaceous plants.

Monochromatic colour schemes using a single colour, though possible, may result in monotony. There are, however, exceptions. In “moon gardens” to be enjoyed at night, species with white flowers blooming after sunset are planted with beautiful effect. This is a good example of successful use of a single colour. In a dichromatic arrangement, two opposing colours of the colour wheel are employed to contrast with each other. Such contrasts can also be obtained by using a dark and light colour, a hot and cool colour and a bright and dull colour. In triads or trichromatic colour schemes, alternating colours in the wheel, yellow-red-bleu and orange-violet-green are
employed. In a polychromatic scheme various colours are used. In this case, rhythmic repetition of colours is necessary for unity of design. The order and sequence of colours in any such arrangement need not follow a rigid dogmatic pattern. Further, providing sufficient contrast by juxtaposing opposite colours will avoid a tiresome visual effect. A bright sun and a clear blue sky a backdrop permit the liberal use of bright colours in South Indian landscape. For perception of colours, light is essential. Subdued light of the moon makes white enjoyable. But perception of colour in the garden is influenced no only by light but also by shade, distance and neighbouring hues.

**Shape**

Shape refers to the outline or configuration of an object. Solids fill space and have a mass. This mass has an outline or configuration. The total effect given by the mass and its outline is shape. Liquids like water take the shape of the container in which they are held. Trees and shrubs take definite shapes, which though subject to time and growth, are constant at any point of time. These shapes are the total effect of the trunk, branches and foliage. Man changes their shape by pruning and training. Climbing shrubs take the shape of the support on which they grow. The beauty of any given shape consists in the line, curves and volume.

Symmetry or the lack of it is another interesting factor. Particularly the palms and some species of trees show near or total symmetry. The traveller’s tree (*Ravenala Madagascariensis*) shows symmetry only in a single plane owing to the fan-shaped arrangement of leaves. Symmetrical shapes are not uncommon in trees. This may be seen in slanting or S-shaped boles topped by canopies which are perfectly balanced against the pull of gravity. These asymmetrically balanced trees are more graphic than symmetrical trees. Interesting shapes can also be met with in the organs such as leaves, flowers and fruits.
**Texture**

Texture refers to the surface structure. Appreciable differences in texture can be noticed in tree species with reference to leaves, flowers, bark and other organs. The tree form offers various textures which may be described as fine or bold, coarse or soft, velvety or leathery and downy or hairy. Generally spading, small needle-shaped leaves provide a fine texture; the effect of large broad leaves is coarse. It is well worth remembering that used in proper context; both the textures are effective in design. The massed effect of the small leaflets of the tamarind and similar trees having pinnate leaves is fine in textural quality. Trees in bloom provide a velvet-like, downy or hairy look. The leathery quality is associated with leaves of certain species of *Cordia* and a kind of waxiness with *Calophyllum*. The texture is referred to as loose when the canopy of leaves is light and sparse (*Acacia* and *Eucalyptus*). The tufted look of the canopy of *Ailanthus excelsa* with its leaves cluttered at the tips of branches is another textural variation. The bark also offers interesting variability in texture. The smooth, rough, split, peeling or spiny bark is interesting and provides visual contrasts.

**Pattern**

Pattern is the scheme or model which one finds in the natural arrangement of plant parts. The feathery leaves of the coconut palm, the fan-arrangement of leaves in traveller’s tree and the tiered branching of the *Terminalia* offer interesting patterns. Repetition of pattern is a feature of plants and their organs.

**BEAUTY PRINCIPLES**

The aesthetic components by themselves do not convey beauty. It comes apparent when these components are admixed, virtually correlated and juxtaposed with one another adopting certain principles, namely, *balance*, *rhythm*, *proportion*, *scale* and *harmony*. 
The balance in landscape design is a visual equilibrium of different garden elements. In the formal garden, this is achieved by positioning plants and other landscape objects at equal distance from a real or imaginary plane or axis. The equal arms of a balance with a central fulcrum will illustrate this point. In this principle of the fulcrum, if one of the arms is longer than the other, two unequal weights would match each other. The smaller weight counterpoising the longer arm would balance the heavier weight on the shorter arm. Visual matching of garden elements to simulate the above mentioned phenomenon can be arranged. For illustration, a large tree stands counter-balanced with a group of shrubs by adjusting the distance or arm in each case from the imaginary point or arms. Again, to go back to the fulcrum. In an instance with two equal arms, a kilogram of iron filings with higher specific gravity will be balanced by an equal weight of cotton, but possessing a higher volume than the iron filings owing to its low specific gravity. To cite a garden example, a large mass of white, yellow or blue flowers will be balanced by a relatively low volume of red or orange flowers. The balancing in design is purely visual. In the informal and naturalistic designs, balancing is mainly a neutralizing effect. For clarity, a few examples from life’s day-to-day experiences will be helpful. Paired opposites like joy and sorrow, night and day and pleasure and pain neutralize one another. Garden components are also designed to obtain a similar yet neutralizing effect of balance. Opposite colours in the colour wheel, contrasting textures, different numbers, shapes, forms line and pattern are cleverly employed to neutralize one another.

The above account adequately conveys the contrasting and neutralizing role of balance. The composition of a picture depicting a mother with child in her arms attains balance by the contrasting effect. Similarly a wrinkled, toothless old man sharing a joke with a chubby tow-year old child conveys balance in composition. A tree laden with fruit and a gnarled old tree
supporting a climbing shrub in bloom also give the same balanced look. The visual metaphors in them may also be noted.

**Fig. 4:** A Balance: 1. The arms of equal length and the weight also equal-symmetrical balance. 2. The arms are unequal and the weights are also unequal-total asymmetry. The principles of physical balance can be extended to natural phenomenon.

**Proportion**

Proportion refers to the share of the different parts or components to the whole. To obtain a composite whole, proportional allocation to different architectural and planting schemes should be aimed. In other words, the relationship between the buildings, roads and footpaths, arboretum, shrubbery, water garden and other features should have as assigned share in proportion to the design considerations and requirements. This is not to say that the extent, size and content of the features should be equal, unless otherwise required in the introduction of formalism in the design. On the other hand, they should occupy a position in proportion to their importance and in definite ratio to each other. For further clarity, it may be stated here
that proportion refers to all ingredients being mixed in right measure, not essentially in equal measure.

**Scale**

Scale is a relative dimension. The height and spread of trees and shrubs and the spread of the water garden are determined by adopting a scale, as one might adopt a scale in preparing a map. To make it clear, it may be noted that a small reflecting pool underneath a large tree will be dominated by the tree and render the pool ineffective, owing to the difference in their dimensions. To get the right picture of a tree beside a pool we should adopt a ratio between the size of the three and pool as is obtained in nature. Nature is often very lavish. The large rivers, high mountains and rushing waterfalls are created on an elaborate scale. Man, in copying them, in his designed landscapes, reduces them in scale and relates them to a size convenient and acceptable to him. Appropriate adoption of scales and proportionate measurements are the success of imitative naturalistic garden art.

**Rhythm**

Rhythm is measured cyclic repetition. Nature has its own rhythm. The unfailing repetition of day and night, the measured beat of the heart, the seasonal occurrence of spring and the annual setting in of the monsoon are rhythmic. One may also note the similarity of the Sanskrit word ‘ṛtu’ and rhythm. The periodic growth, flowering fruiting seasons of trees have a repetitive charm, which does not loss its appeal for being repetitive. In music rhythm is the result of varying tones. According to the intensity of the pitch ascending and descending rhythms are achieved. In dance also ascending and descending rhythms are artistically employed in both music and movement. The ‘Tillana’ and Kalasam’ of Bharathanatyam pertain to change in rhythm. When rhythm is not apparent, the dance music become monotonous due to a lack of variety. In Indo-Saracenic architecture, the symmetrical, repetitive use of the onion-shpaed domes serves the purpose of
breaking the monotony of the horizontal roof outline of the structure. The use of ‘Kalasam’ in temple ‘Gopuram’, the entrance tower, also serves the same purpose. In landscape designs, rhythm of the performing arts and architecture are effectively copied. The commonest form is to vary the heights of hedges by providing domes and simulated pillars and reinforcements. The rhythm of cleverly repeated colours and shape and wavy, repetitive outlines of tree groups viewed against the sky help to break monotony.

**Harmony**

Harmony is the pleasing effect obtained due to an apt arrangement and collation of the various garden features. Every part of the landscape must unobtrusively merge into a whole. To borrow an illustration from literature, a novel may consist of a large number of characters and a plot and subplots involving them. But the narrative will progress to a composite whole story. In the same way, designed landscape features should culminate in an integrated picture. No individual part should detract the value of the others. One should strive for harmony not only among the garden parts, but also between the garden and the building which it is to complement. Ultimately these should harmonize with the natural landscape beyond the boundaries of the treated plot.

**Unity**

A designer takes recourse to the aesthetic principles of balance, rhythm, proportion and harmony to give unity to the composition. Without it chaos will prevail. To sustain changing interest and variety, diverse features are necessary. The designer, therefore, aims at both unity and diversity, which though apparently antagonistic, are not difficult to accomplish in landscapes. In garlands, flowers of various kinds are used. The string used to weave them together unites them into one pleasing whole. In the same way, effectively laid out paths, a stream, grouped trees, an expanse of lawn, rhythmic repetition of colours and many other features are incorporated in
landscape design to attain unity in diversity. Another means of achieving unity is to have a central theme for the composition.

The phenomena described below are important in creating visual illusions in the landscape. They also form essentially a part of the garden aesthetics.

**Perspective**

As already discussed, designing is done in three dimensional space. Objects situated away from the viewer look smaller in size. In a train, turning a curve, the bogies towards the rear look smaller in size than the proximal ones. To consider another example, the two parallel lines of the rail tract seem gradually to converge with distance. These visual phenomena of shrinking size and converging lines (Fig. 11) are known as perspective.

**GARDEN STRUCTURES OR CONSTRUCTED FEATURES**

**ROADS AND PATHS**

Convenient roads (drive) footpaths (walk) are necessities in the garden from the functional standpoint. The path helps to direct the flow of pedestrian traffic and the road does the same for vehicular moment. But, too many paths and roads cutting across the landscape actually give the impression of a far diminished area and size of the garden looks smaller than it actually is. They also give an impression of artificiality in the landscape. On the other hand, the absence of path and road would lead to avoidable wear by foot beaten tracks. A compromise is the only solution. Therefore, a consideration of their layout and formation is pertinent here.

**Road**

The road connects important points in a garden or in a small home site, the street and the garage (car shed) and carport. Long, winding roads can be a feature in extensive landscape designs, but not on small home sites. An important consideration in layout is to form an easily negotiable way with no
sharp turns and bends. The maximum slope or gradient of 1 in 12 has to be adopted, out of necessity dictated by the terrain. The width of the road should be 5.0 m or in any case, a minimum of 3.5 m. There should be gutters on either side of the road for free drainage of rain water. The earthen surface on which the road is formed is known as the formative surface. Over this, for metalling, broken granite and quartz of 3.5 cm gauge or ‘kankar’ of 5 cm or broken ferruginous laterite of 5 to 7 cm should result in heavy dust and a short road life on constant use. Hard metals will not be amenable to good binding resulting in an uneven surface. We should not mix two different kinds of metals. The metal is packed firm by hand using hammer and road rollers. The interspaces are filled in. Finally a coating of sand to a thickness of 0.5 cm is given. Sufficient rolling, on being wetted with water, should follow. The finished road is convex in cross-section.

The road surface may also be black-topped over broken granite or gravel. A concrete surface is still better from the standpoint of easy upkeep and maintenance. Short roads can be paved with flag stones.

**Footpath**

Footpaths are formed to a width of 1 – 1 ½ m. It is ordinarily made of gravel spread to a thickness of 5 cm. The gravel requires compacting frequently. The edges of the path should be made of concrete or cut stone to hold the gravel in position without being splashed or scattered. Paving the paths with bricks or concrete is more effective and permanent. In high rainfall areas, the danger of a slippery surface due to slimy, algal growth should be avoided. This is done by giving a coarse finish to the surface and also by scrubbing it with sand.

Winding ways, both drive and walk, with shrubbery in the bay conceals the view ahead. This helps to generate curiosity to know what is further on and brings about an air of mystery. To prevent being tantalized we should provide a pond, flower bed or at least a bench in the concealed bay. In informal and picturesque designs, this feature is exploited to the full.
Straight and level walkways will prod the pedestrian to move on, with an easy, steady flow of traffic. An ascent on its way will make the traffic flow hesitant of onward movement. A descent, on the other hand, will speed up pedestrians. A level stretch after an ascent or descent tends to collect a crowd thereon. In public gardens, this influence of the gradient on pedestrian movement can be utilized in crowd regulation and smooth flow of traffic. In sleep ascents and descents, steps should be provided from a practical point of view.

The central or approach roads and paths in a garden are laid out either in circular or spinal fashion (Fig. 5). A circular road is very efficient in the dispersal of traffic. A spinal road with lateral ones in a herring-bone arrangement also serves the same purpose. The manner in which traffic circulation is solved will depend on the terrain and the volume of traffic anticipated.

**Fig. 5:** The approach road in a garden is either circular or spinal: Suitable combinations and modifications of the two are also possible.
**Bridges**

Bridges across streams and embankments are necessity in a garden. These bridges should be harmonious with the landscape in both the design and the material used. In a picturesque design, rustic looking material is more appropriate than formal one. In any case, the colour and texture of the material used can be discretely employed to bring unity with the building and other structural features in the property. The practical considerations are that the bridges should be functional and structurally sound to withstand the weight it is expected to stand. In hill districts or in flood-prone areas, suspension bridges of wood, stone or reinforced cement concrete linking pathways across streams will add to the look and naturalness of the garden.

**Steps**

Steps are required for easy ascent or descent from two different levels in the garden. They connect paths at two different levels and are intended for pedestrian use. The total width should conform to the width of the footpath which the flight of steps is joining at either end. The height will depend upon the difference in level of plots. But for ease of climb, the ‘tread’ or horizontal surface of step should be 40 cm wide and the ‘riser’ or vertical face, 15 cm high. While constructing a flight of steps, start from the lower end and work upwards. The materials for construction are stones and bricks properly cemented in place. Wherever irregular, unchiselled cut stones are used, plastered over with cement mortar. Use of flagstones to construct steps is a traditional practice adopted in this country. A flight of steps built with flags are sturdy and stand for centuries. Give a smooth or rough finish to the steps according to the demands made by landscape design and style of architecture. The steps when recessed have an advantage in that they do not project out into the garden features at the lower end. A graduated flight of steps is desirable in places where the approach to it is from different angles, through diagonal footpaths.
**Greenhouse Conservatory and Glasshouse**

These are special plant growing structures. A greenhouse properly constructed provides a cool, airy humid place to grow plants which would thrive under these special environs. The roof and the supporting features are of stone, concrete wood or angled iron with the whole structure enclosed in wire-mesh. Provision of benches inside is a necessity to display plants mostly raised in containers. Partially cover the greenhouse with spreading climbers for shade. A glasshouse develops high temperature inside, but in the warms plains only and not in the hills. This is not conducive to plant growth. Provision of inbuilt, shallow but expansive tanks with a large surface for evaporation of water, will help to increase the humidity inside the greenhouse and glasshouse.

**Thatched Huts**

In a relatively large garden, construction of thatched, comfortable huts will serve as retreats from noise, head and dust. These huts should be in a relatively isolated corner and suitably camouflaged with foliage and flowers, to be out of sight in order to ensure privacy from unknown intruders.

**Bandstand**

The bandstand is a circular or hexagonal structure open on all sides with a solid roof for shelter from rain and sun. It may be seen in the typical English gardens of our hill stations. They served, in formal receptions and other ceremonial functions organized by administrative dignitaries, as locale for the band to play. They also provided shelter to visitors from the elements at other times.

**Gazebo and Gatehouse**

A gazebo is a tower intended to provide an aerial view of the entire garden from an elevated place. It is very suitable for an English garden. More characteristically, a gatehouse matches well with the Indian garden scenery.
In ancient days gatehouses were necessity for feudal houses as defence against marauders. A tasteful adaptation of this will be an added attraction at the entrance to the garden.

A discerning designer has much to choose from the architectural tradition of the country in regard to garden structures. The ‘mandapam’ built according to traditional architecture using stone, bricks and wood is both beautiful and functional. As far as garden structures are concerned, limit the use of cement to functional purposes since it is an unsympathetic material where garden art is involved. More effective are wood, stone and metals like brass and bronze in naturalistic designs.

A word about the final finish to the garden structures. They should be given either a manicured or rustic look as is desired an intermediate, partly finished look is also acceptable. But mixing the three, that is manicured, rustic and intermediate finish is not compatible.

**NATURAL ELEMENTS IN LANDSCAPING**

For spatial design, the important natural elements used in contrast to the aesthetic components discussed earlier are rocks, water and plant.

**ROCK**

According to legend ‘rock is root of cloud’. Weathered natural rocks with latent beauty in them, in convenient sizes, can be seen in different locations in beds of rivers rushing down in mountain country and also in dry regions in the exposed knolls. They are scarce in deltaic districts. These rocks are valued in garden design for their interesting shapes. The range and variability of shapes and size give them a sculptural quality. Those with natural curves and smooth outlines are more valuable than others. Their surface texture is another attractive feature. Cobbles and pebbles found in water courses are generally smooth. A coarse texture in varying degrees is seen in weather-worn boulders which have a statuesque beauty. It is a good
practice to retain natural outcrops of rocks or exposed bedrocks whereer available and to incorporate them in landscape design. The elephant Rock bordering the estate of the Agricultural College, Madurai is a monumental instance of a natural outcrop of a monolith. It is about a kilometer in length, with a height often reaching 30 m. When viewed from the south-east direction, it gives the pleasing picture of a humped elephant sitting on its haunches—an imposing prospect. Similar monoliths, including the Elephant Rock have attracted the attention of early Hindus, Buddhist mendicants and Jain monks, the cave temples and sculptures being proof for this. They considered them sacred. The permanency of rock adds to their value.

Granite stones are available in nature as little round blocks and boulders. Smooth granite domes and mono rocks are also interesting features of the countryside. The natural arrangement of these rocks can be simulated in the garden. In nature, they are commonly seen in blocks, arranged one over the other vertically or in scattered groups of boulders. Boulders perched over a mono rock and stream beds strewn over by them are also commonly seen. A pillar rock is a tall protruding one among the surrounding hills. Rock overhangs and caves are also appealing and are often successfully incorporated in gardens. Naming rocks from their appearance or resemblance as ‘Nagamalai’ (snake rock), ‘Pasumalai’ (cow rock) and ‘Annamalai’ (Elephant Rock) is common. These are suggestive words pictures. Interestingly, this has been a practice in all countries.

The colour of granite varies from grey, dark grey or grey tinged red. Some of them may have clear horizontal lamination, desirable feature for the designer. Laterite stones from areas of heavy rainfall have a dark red colour being brick red on recently exposed surface. They are relatively soft. The surface is coarse and the shape also may not be well defined, as in the case of weathered granite. Sandstone available in some localities is another good choice. The quartz crystals make a beautiful addition to gardens and the appeal is mainly due to their luster. Their shape is irregular and may have
sharp angular projections. They are easily stained when they come into contact with the iron oxides of red soil. Chunks of lime stones excavated in dry belts, locally known as ‘odakkal’ have rough surface and grey-brown colour.

After locating suitable stones, transporting them to the site will require practical consideration. A cubic metre of granite may weigh 2.5 tonnes. Handling them by experienced quarry workers will be necessary to ensure the integrity of the stone and safety of men. In fixing them in a place, the stones should be anchored sufficiently deep. Bury a stone to half its length on its broader end. Give variation in height and composition. In these cases, the height of the rock should not exceed the maximum height of the level of the land. Any possibility of the rock getting dislodged due to top-weight is to be avoided. Stones can be displayed in combination with water, sand, grass and Japanese gardens. The Japanese take immense pains to choose the right kind of stone. Aptness in the choice of stones cannot be overemphasized. Arrange and weather-worn rocks in dry association. Properly chosen, they add to the picturesque quality of the garden. Rocks have a key place in rockeries and rock gardens. In a rockery, the rocks dominate over plants while in a rock garden grouped plants are more conspicuous than rocks. In all situations no set rules can be formulated to group stones, the aesthetic principles enunciated earlier being the sole guide.

The smooth course always is to use local rocks owing to their easy availability. They will also blend with the surrounding landscape with ease. Where special effects are required or in the absence of a local supply, as in deltaic districts, procuring them from other regions can be resorted to.

**WATER**

Beauty of water in the garden is primarily due to its property of being a reflective surface. Still water reflects trees and buildings. Inverted images play on human imagination. The mobility of water is another aspect of its
attraction. Running streams and billowing waves have tickled human sensibilities in every civilization. Besides, man-made fountains and pools have been sources of un-alloyed pleasure from ancient times.

Water has the property of flowing from a higher to a lower level. When held in containers or the flow is arrested, it is immobile. The mobility of water may be near horizontal as in river. In falls and cascades, water rushes downward. In downward movements, the pull of gravity is the motive force. But water can be made to move upwards. Water, because of its fluidity, if forced through a narrow opening such as a nozzle under pressure, can be made to move vertically upward, as in fountain. In nature, such a phenomenon is rarely found except in artesian wells. In garden practice, still water as swell as water in motion has their place.

Water is used in the garden primarily in three ways. In the first instance, a large body of water envelops a garden or structure. A natural or excavated lake envelope a garden or a structure which is located in an island n the midst of water. The ‘Teepakulam’ with a ‘Mandapam’ in the midst of it is an ancient use of water in this way. The Golden Temple in Amritsar is in the midst of a man-made lake. Water is used here as reflective surface. A meandering river bisecting a city or a running stream traversing through a garden is another instance. Madurai is bisected by the river Vaigai. The appeal of water here is due to its mobility. Water in ponds and pools as a central feature forms a way of water use, different from the other two mentioned above. The movement, if any, is only vertical in the form of a fountain. Combining running water with a pool either as its source or end is also a pleasing possibility.

The prominent instances of water having been put to aesthetic use in south Indian landscapes are the placid lakes at Ootacamund, Yercaud and Kodaikanal. All of them were made in the early 19th century by obstructing the free flow of streams by masonry dams at the narrowest point along their courses. A smaller but still very attractive lake can be seen at the Sim’s Park, Coonoor. The lake is situated in a saucer-shaped valley. The stream
feeding the lake and the overflow from it skirts the valley. The stream feeding the lake and the overflow from it skirts the valley. All these lakes depend on rainfall for replenishment of water. There is no natural lake in this part of the country.

Rushing water in scenic spots is highly appreciated. The waterfalls at Courtallam (Tirunelveli district) are famous. At Hogenakkal, literally ‘Smoking Rock,’ in Dharmapuri district turbulent river Kaveri comes through gorges in a precipitous terrain. Silver Cascade and Fairy-falls at Kodaikanal are also part of the delightful scenery in this hill resort. These cascades, falls and rushing streams are a major feature in the hill country. In the plains they are slow, taking meandering or sinuous course, for want of incline in the landform. The palm-fringed lagoons and backwaters in the coastal districts are also beautiful.

The major river systems form another important source of water. These rivers along with the lakes and tanks which they feed have contributed much to the landscape. In the dry districts also the innumerable percolation tanks fed by ‘nullahs’, seasonal or perennial, have added to the scenic beauty. These tanks have immensely contributed to the creation of the cultural landscape in south India and Sri Lanka almost from the 1st century BC. A large body of water like rivers and lakes permits recreational use, mainly boating and fishing besides providing relief from extremes of temperatures. Water was used extensively in Moghul gardens and architecture, and inner courtyard gardens in dwelling in the desert regions of Rajasthan.

The constructed garden pools may serve entirely a reflective function. They are also useful to grow hydrophytic plants. There is, however, a warning. In large water expanses, growing plants will naturally end up in their not being useful for recreational purposes such as boating. This is due to the obstruction, created by the vegetation. The extensive irrigation tanks in the southern districts of Madurai and Ramnad served by the river Vaigai is sometimes used for raising lotus. Though this does not limit their irrigation
and fishing potential, it does not permit any water sports, owing to the matted spiny growth.

In the hills, where ponds are made by tapping underground water or damming perennial streams, waterproofing the pool is not necessary. In the coastal regions also, where water can be found at near surface levels, there is no need for it. Construction of masonry walls to prevent a collapse is sufficient. In lowland dry regions where water supply is seasonal and precious, the tanks, ponds and pools should be properly lined with waterproofing material, to prevent water seepage. A concrete floor with masonry walls will often be enough. Concrete pools re-inforced with wire mesh laid over 800 gauge polyethylene sheets will be durable. The large tanks, as is the practice, should be excavated to the level of the bedrock. The embankments formed to hold water require lining with slabs. The ancient practice of lining them with cut and chiseled stones will add more visual appeal than cement slabs. The stone interspaces are then painted with a mortar of cement and sand. The shape and size of these tanks will be dictated by the gradient of the land and the volume of water it is expected to hold.

**Fig. 6:** Shapes of Pools: 1. A formal pool. In formal pools various well-defined geometrical designs are adopted. 2 & 3. Natural pools with inlets and bays. 4. A natural pool with islands.
The formal shapes of pools bear resemblance to star, cross or other geometrical shapes like square, rectangle and hexagon to suit the layout and architecture (Fig. 6). The different shapes in which framed mirrors come are worth copying here. In natural designs, the beauty of the curve is exploited by designing curvilinear and other natural shapes, often with the inclusion of tortoise-backed islets. Here, the surrounding landform is shaped into a rolling one sloping away from the water feature. To add to the natural look, the pool is constructed in the normal way, but by providing sufficient width to accommodate natural rocks to line the walls. The irregular inter-space between the wall and the rocks is then filled with silt and sol to grow marsh and swamp plants. As has been stated earlier, tanks are filled with water from well, river or stream. In the hills filling pools with gravitational flow of water is sometimes feasible. In the dry regions, a pumping arrangement is necessary for this purpose.

Another aspect to consider is the depth of water. The large tank is around 3-5 m deep at the deepest point. A reflecting garden pool is preferably shallow with a depth of 25-30 cm. If hydrophytic plants are to be grown, varying depths have to be provided in the same pond, which may range from 15 to 90 cm, the deepest portion allotted to lotus and water lilies. In shallow pockets and galleries, swamp plants such as *Typha* and *Cyperus* are accommodated. *Salvinia, Pistia* and other floating plants may be conveniently added to this grouping. Provision is necessary to prevent rain water and through it silt entering into the pool. A slightly raised rim to a height of 10 cm will be helpful in this regard. Provision to drain the pool by providing an outlet at its floor level will help to clean it, as often as is necessary.

**PLANTS**

As will be seen in the ensuing pages, plants constitute the most important natural element in designing landscapes.
**Plant Association**

The present-day approach to landscaping is deeply influenced by ecology and environmental science. Ecology is the study of organisms (plants and animals), in relation to their environment. It is necessary here to have a concept of the environment or external conditions and influences moulding the life of organisms.

The environment consists of physical and biotic factors. Non-living materials like soil, water and air and the forces of solar isolation and gravity constitute the physical environment. The biotic environment is characterized by the inter-relationship of living organisms. The organisms encounter these physical and biotic factors through life. The developmental cycle of life is co-coordinated to fit their organic needs in relation to the sum of all external conditions and influences referred to earlier, above.

In a landscape, plants are important tools in the hands of the designer. In the successful use of plants for this purpose, he creates an appropriate habitat or natural home for the plants to live in. In designed landscape, the aim is to group plants, rather than display individual specimens. The grouping of plants should be natural, of mutually tolerant species. It should be remembered that plants live in established communities. The nature of the community is determined by the habitat. Thus there are hydrophytic communities in or near water, xerophytic communities in desert situations and mesophytic communities which prefer a situation different from the two extremes mention above. There are specialized communities of epiphytes which live high up on other woody vegetation but do not draw nourishment from their support. The halophytes live in salt marshes. There are also xeromorphic halophytes which are salt-tolerant plant species living in arid situations. The association of plants in these communities is determined by ecological considerations of climatic, edaphic and biotic factors. A brief discussion of these factors is necessary to understand their role in making plant communities.
**Climate**

The climate of peninsular India is generally warm. The maximum temperature may reach 35-40°C and minimum 15-20°C. This is, however, considerably modified by the influence of large bodies of water, the Arabian sea is the west coast and the Bay of Bengal on the east coast. In these coastal regions the diurnal variations of temperature are reduced, the difference between the day and night temperature being around 3° to 4° only. For the same reason, the difference in summer and winter temperatures is small, resulting in no distinct winter season. In mountainous regions such as the Nilgiris, Shevroys and Pulneys, the climate is cool with relatively low mean temperature. This is due to the influence of altitude.

**Soil**

Soils play an important role in the formation of vegetation found in particular area. Soil is the uppermost layer of the earth. It is formed by continuous weathering of parent rocks for millennia. Under the soil lies the sub-soil. The soil and sub-soil support plant growth not only as a stratum for anchorage but also as a store-house of nutrients and water for the plants to draw upon. Besides weathered rock, the soil is also composed of living organisms such as bacteria and fungi, the soil micro flora. The soil of fine particles like clay and silt and coarse particles of sand and gravel. A grading of soil by mechanical analysis of these particles is given below: Sandy—less than 10 percent of fine particles (clay + silt), loam – 20 to 30 percent, clay loam – 30 to 50 percent, clay – more than 50 percent. Calcareous soil contains more than 5 percent of calcium carbonate. When more than 5 percent of organic matter is present, it is known as humus soil. A gravelly soil will contain considerable amounts of gravel.

Soils are generally classified for common purposes as black, red, sandy laterite and alluvial. Black soils are highly clayey, dark grey, with good moisture retention capacity. Red sol contains considerable iron oxides from
which the colour is derived. Red soil is rich in available plant nutrients. It
does not rack or split when dry, as does the black soil. Sandy soils are
found in beaches and courses of rivers and streams. The sandy soil has a
very low water retaining capacity, loosely structured and poor in plant
nutrients. Beach sands contain sodium chloride (common salt) to a level
injurious to many plant species. An alluvial soil found in the deltaic regions
is a transported soil, rivers being the vehicle of transportation. These soils
are loamy with equal proportions of clay and coarse particles. They are well
enriched with plant nutrients.

The acidity of the sol is an important aspect in plant adaptation. Acidity is
measured in a scale known as pH (hydrogen ion concentration). In this
scale a reading above pH 7.0 indicates alkalinity due to the presence of
carbonates and bicarbonates of calcium, magnesium, potassium and
sodium. A reading elbow 7.0 indicates an acidic reaction. Soil classification
based on pH reading is as follows:

<table>
<thead>
<tr>
<th>Acidity</th>
<th>Range of pH</th>
<th>Alkalinity</th>
<th>Range of pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>4.0 – 5.0</td>
<td>Slight</td>
<td>7.0 – 7.5</td>
</tr>
<tr>
<td>Fair</td>
<td>5.0 – 6.0</td>
<td>Fair</td>
<td>7.5 – 8.0</td>
</tr>
<tr>
<td>Slight</td>
<td>6.0 – 6.5</td>
<td>High</td>
<td>8.0 – 9.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>6.5 – 7.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plants for their optimum growth have specific adaptations to pH ranges.

**TREE FORMS**

The form of trees is an important design feature. The form here refers to
shape and size (Figs. 7 to 9). There are two basic shapes recognizable in
trees, of vertical growth or upright habit and the horizontal or spreading. In
the first instance, the height dominates over spread and in the second, the
spread is more than height. A few recognizable shapes coming under these
broad categories are, however, identifiable.
Look at the distinct but characteristic shape of the mast tree (*Polyalthia longifolia ‘pendula’*). The tree is tall with little spread. The shape here is referred to as ‘columnar’. In ‘fastigate’ trees, the shape is the same except for the fact that the tip is rounded. Full grown *Millingtonia hortensis* assumes this shape. The tall ‘umbrella’ shape is characteristic of the palm. Its large leaves radiate from a crown or growing point which is at the apex of a monopodial trunk. The spreading umbrella shape of *Acacia planifrons* is also distinct in nature.

In horizontal growth habit, the laterals are sufficiently long to indicate spread. The ‘oval’ and the ‘round’ are the most common among them. *Peltophorum pterocarpum* and *Samanea saman* are the common trees assuming these shapes. In the two genera *Terminalia* and *Ceiba*, the branches arise in horizontal tiers and are distributed rather uniformly along the trunk. The tiered, whorled branching goes with a ‘conical’ shape. In the ‘open’ shape, the trees have alternate branches which have individual but discontinuous canopies. In this instance, there will be open sub-spaces in the tree outline. Old trees of *Syszygium jambolanum* and *Terminalia paniculata* take to this shape. In the ‘weeping’ trees, the branches droop. In some conifers and willows, this shape can be seen. In the warmer parts of south India, *Polyalthia longifolia ‘pendula’* cited earlier shows weeping growth. It is both columnar and weeping. *Callistemon citrinus* is another tree which has long drooping branches.

‘Picturesque” shape is one which is asymmetrically balanced against the pull of gravity and odds of nature. It is shaped by natural forces like rocky soil and incessant wind. They are suitable for specimen planting and in the design of natural gardens. These interesting shapes have inspired “bonasai’ enthusiasts the world over. Tree is living sculpture. The sculptural value of a tree is determined by its form that is its shape and size. The form of trees when cleverly exploited give contrast and a softening effect to the harsh architectural lines of buildings. Shape and size of trees can also be modified by training and pruning to sit the architectural needs.
Tree shape is not static. With time and age, the shape changes. The woody species may often take 20 years or more to assume a distinct shape often one may come across intermediate shapes also, defying categorization. The environmental factors such as wind, competition for light and interference by man and animals have determinate influence on shape. In course of time, trees have a time-worn look. These old trees are a synthesis of anguish and primeval strength, that is to say, they become venerable and assume an antique value.

Fig. 7: Shapes of trees: 1. The spreading tree. Here the line a b is longer than c d. 2. The upright tree. The line a b is shorter than c d. A columnar tree. 4. The umbrella shape of the palm. 5. The conical tree. 6. The round-headed tree. 7. The picturesque tree.
Trees, is closely planted groups, do not express their shape in full. The outline of individual trees may be lost by two or more crowns merging to give common canopy. In horizontal groups, even colunar and fastigate shapes merge into a continuous, horizontal, wavy line. This is often cleverly exploited to soften the harsh jagged lines of mountains and their cliffs.

![Diagram of various tree shapes](image)

**Fig. 8:** Some more picturesque shapes: 1. The S-shaped tree. 2. The twisted trunk. 3. A buttressed tree. 4. Slanting tree. 5. Twin-branched. 6. Three-trunk tree.

The size of trees is expressed in terms of height and spread. Some trees are ‘very tall’ with a height of 30 m or more. *Antiaris toxicaria* and *salmalia malabarica* are examples. Trees like *albizia moluccana* and *Terminalia arjuna* reaching height of 20 m are ‘tall’. Trees that reach 10 to 20 m are ‘medium tall’. Most of the common trees planted come under this category. *Peltophorum pterocarpum* and *Holoptelia integrifolia* are medium-tall in
stature. Short trees have a height of 5 to 10 m. The stature of *Guaiacum officinale* and *Citharexylum spinosum* qualifies them for inclusion in this group. Any woody perennial below the height of 5 m is a shrub. Shrubs may also be grouped, in turn, tall (4-5 m), medium tall (2-4 m) and short (below 2 m).

![Fig. 9: Picturesque shapes: 1. Cascade, 2. Exposed root, 3. Coppiced tree, 4. Lopped tree. Similarly, wide variations are also noticeable in the spread of trees and shrubs.](image)

Availability of space for planting is an important consideration in the notice of tree form. Columnar and fastigate trees will fit in narrow spaces. It is difficult to accommodate large spreading trees like the Banyan in the limited space of home landscape, but in vast public parks, large trees are most suitable.

**PHENOLOGY**

One good consideration in the choice of trees is the beauty of their flowers. The visual effect of these flowers is a result of colour, texture and contrast and also the display they make of them. Some critics hold a different view.
They allege that flowering trees have a shortcoming in that the colour "spread" is not adequate as compared to, say, annuals. But then trees are not esteemed for their flower alone. There are definite seasons when flower emerge, giving an impressive dramatic effect. The study of the response of trees to climate and seasonal changes with regard to flowering and fruiting is known as phonology.

**TREE AS DESIGN ELEMENT**

Trees define space, as arranged furniture would define a hall or roof and walls, a building. As a result, spaces appear vast and open or shrunken and enclosed, bodily exciting, or mentally peaceful, stimulatingly warm or restfully cool. The grouping of trees for this purpose is done in different ways. A short account of this is given below.

**Direction**

Trees define roads and paths, when planted along their margin. This is known as avenue planting and helps to direct traffic. This can also be done by raising hedges on either side of the road. When the distance of a road or path is very short, shrubbery borders are more appropriate than avenue trees or hedges. To avoid traffic hazards, trees should not be planted close to the inside of curves or near road junctions where they could obscure vision.

**Screening**

Grouped trees serve the purpose of screening objectionable sights, glares and even sound. Tree screens also provide privacy and protection from strong winds. The density and position of the screen will determine its effectiveness. The angle of the afternoon sun and the direction of wind are taken cognizance of in placing trees.
**Emphasizer**

Location of a sign-board, statue (Fig. 10) or an entrance can be emphasized by appropriate grouping of trees. The grouping will be very effective when it contrasts well with the object it is to emphasize and also the way it stands out in the surroundings.

**Fence, Barrier and Boundary Line**

Hedges are traditionally used as physical barriers to prevent men and animals encroaching into a property. Low hedges under 60 cm demaracate a boundary but will not act as a barrier. A hedge of 1.5 to 2 m is a good barrier. To give a screening effect, a height of 3 m and above is required at times. Trellis-trained bougainvillea above low compound walls, commonly seen in our residential areas serve the purpose of screening, while also serving as an effective barrier. The purpose of planting a screen, trellis and fence is to enclose space.

![Fig. 10](image)

**Fig. 10:** The tree emphasizes the statue. The sign-board is emphasized by the group planting.

The garden and the building thereon belong to each other. The house is built first. The landscape designer comes into the picture after the construction is completed or when it is about to be completed. The designer then must see that the tree grouping and the house are inseparable and blend with each other. Under no circumstances should the plant groups look like an after-thought, though in truth it is so. The house and garden
should then imperceptibly merge with the surrounding scenery, of which they form a part.

**PLANTING IN RELATION TO BUILDING**

In grouping trees in the vicinity of structures, certain important considerations need emphasis. Trees are planted for formal effects in large formal gardens, in tree borders and also informal approaches to houses. Trees planted to form groves and clumps are effective in natural designs. Further, trees with appropriate forms and right spacing, accentuate the lines of building by strong contrast in form or by enlarging the effect by repeating a form. Conical trees repeat turrets and gables of Indo-European style mansions and places of worship. Round-headed and spreading trees, on the other hand, contrast with turrets and minarets. As a general rule, where historicity of a building is not in consideration, contrasting form is desirable, conical and columnar form to contrast with horizontal forms of architecture and round-headed trees to contrast with strong vertical accent in buildings. However, it should be borne in mind that resort to over contrast in composition will disturb the feeling of tranquility and peace.

In structures and constructions which are a significant part of history such as forts and antique buildings, apt association should be worked out. Here propriety demands that endemic and indigenous trees which have formed a part of our culture alone should find a place.

Scale or the right ratio between the size of tree group and house is also important. Large trees make the house look smaller and more snug. Small trees framing a house make it look large and stately. A few suggested methods for planting in relation to building are given below.

**Planting Climbers**

Climbers trained on or against walls unite or “tie-down” the building and the land. The climbing shrub so planted need not be in contact with the wall. By providing a suitable framework of wrought iron or bamboo to train it, the
contact with the wall and the inconvenience caused to annual white-washing and colour-washing can be avoided. A climber should be planted in corner or against a pillar, at least a metre away from the foundation. The choice of a particular climber will depend upon the decorative value of its flowers and foliage. The shelter and protection given by it from hot sun and prevailing wind are additional considerations. Fruit trees and flowering trees trained as espaliers and fans against walls also serve the same purpose.

**Foundation Planting**

Grouping of shrubs and small trees to conceal the raised foundation is known as foundation planting or basement planting. The best effect is obtained with unsheared plants, when their foliage, flowers and berries merge into the outline of one another. They can also serve the purpose of providing a screen that does not obstruct ventilation. Shrubs below windows can be deliberately kept low by pruning or by choice of a species with the correct form. By repeating a few plants (rhythm) for visual continuity, a design can emphasize the unity.

**Shrubbery Borders or Mixed Shrubberies**

Like annual or herbaceous borders, shrubs can also be grouped to define margins and boundaries or to define space in a garden. In addition to ornamentation, they form a good screen or barrier. We often call this mixed shrubbery in the current terminology, but the term shrubbery border will be more appropriate in the present context.

**Building as Central Point**

When the architecture of a building is an object of admiration as in an ancient monument or in an ultra modern structure, the aim of planting should be to display their value in full. No screening should be done here. The formal planting in Moghul gardens serves this purpose. By keeping an
open centre and a straight long approach, a view is created with the building as the centre of attraction.

**View from the Building**

In a majority of cases, the buildings around us have no architectural value to boast of. Screening the building for privacy and shelter is needed here. While so doing, sufficient opining should be left in the border groups to have a pleasing view of the near or distant scenery. The rising and setting sun, a pastoral countryside, a mountain, the surging and billowing sea or a waterfall will give a pleasing view from the verandah of the house or any other point in the garden. In an urban surrounding where nothing other than steel and concrete or unsightly slums are in sight, it is better to shut out these objectionable views and to concentrate on the internal beauty of the garden.

Any tree planting very close to a building is considered unsafe. When the roots are strong and aggressive, damage to the foundation and superstructure is bound to occur. Precaution to avoid this, by planting a little away from the structure is necessary.

When the area around the house is too small to accommodate a tree, raising trees in planters should be taken advantage of.

**Trees as a Backdrop**

A group of trees as a backdrop to the house will help to highlight or emphasize its architectural features. The outline of the canopy of trees should rise far above that of the building (Fig. 11). The colour, texture and pattern of the trees will serve as a foil and will give interesting contrast to it. The extent of planting should be sufficient enough to give depth to the designed landscape. In very formal treatments in this country, trees are planted at the corner of buildings. Vertical forms of trees so planted are likely to accentuate its height whereas horizontal forms would give an expansive look. A house nestling in woodland, with groups of trees around,
will be enjoyable for many reasons, one among them being the cooling effect of trees on ambient temperature. Concealment of the house partly or in full, by low-headed trees is a possibility here. In such case, keeping trunks of trees free of low limbs and foliage to a height of 2 to 2.5 m will improve visibility either way. Trees carefully placed in relation to the house also give a partly concealed, framed view of the house. The scenic effect of many of the rural houses, in wooded districts, arises from this fact.

Fig. 11: Trees frame building

**Free-standing Trees**

A tree-standing tree is one placed in comparative isolation, usually near a house to shield it from the piercing rays of the sun and such other considerations. Properly trained, it also gives a framed view of the house.

Being near the equator, the radiation of sun’s heat is beyond the tolerance level in our country. Therefore shade, where only reflected light is cast without direct exposure to sun, is welcome throughout the year.
A Small Natural Garden in a House Site

The land available is a small flat strip by the side of the house. Slope the land into an undulating one, if necessary with transported soil. To prevent future silting of the pool, the top 5 cm thick layer is made up of sharp sand. Plant with a good soil-binding grass, “Hariali’, (Cynadon dactylon) for instance. In this particular location, there is an existing large tree at the corner. A row of Polyalthia longifolia along the boundary wall is also an existing feature. These are retained. The pool is of cement-concrete, wire mesh being used for reinforcement. Provision has been made for an island. Water is pumped into the pool. Arranging for this pumping and also to drain it immediately after periodical cleaning are essential. Water worn stones and weathered rocks will add a touch of realism to the landscape.
A Large House

Note the space available in relation to the house. A garden at the frontage adorns the house. The entrance is on the left. A large free standing tree offers shade and defines parking space for any additional cars that may come. The lawn is bordered by shrubs on the north and west and an annual or herbaceous border on the east. The kitchen garden is in the backyard where the cowshed also is located. The space between the kitchen garden and house is the children’s play area. Of course they encroach upon the lawn also at play time. The indulgent parents tolerate it.
A Medium Sized House

This house has approaches from north and west. Large existing street trees cast welcome shade, screening a western sun. A private area, on the east of the house is created by constructing the wall at a tangent to the house. The wall is covered with *Ficus pumila*. Being on the eastern side and enclosed by walls and trees it is cool even in the hottest afternoons. The enclosure with regular watering helps to grow humidity-loving house plants, for decoration in the verandah. An oval lawn diagonally placed in front is noteworthy.
A Large Guest House

Many government and private organizations maintain guest houses for the casual stay of their administrators, technical advisers and V.I.P. guests. The plan given here is for a large guest house with two blocks. The trees planted behind, frame the main block. The two blocks are united by the forked road. The third fork is a narrower footpath. In the middle of the central lawn, a screen (a climber on a 2 m high wire trellis) is placed for privacy though it may partially obstruct the view. The palms lining the road and trees and shrubs are carefully selected to suit an arid region, even though they are maintained under irrigation. The maintenance of a lawn in this zone is labour-intensive and expensive, but rewarding. One hired gardener can maintain the garden.
Landscaping a Hotel

It has twin approach road, to regulate incoming and outgoing traffic. These are separated by a small raised bed of roses. The traffic island found in front of the building is treated in a formal way. An expensive lawn, screened on one side with pergolas, serves as a place for entertainment in the cool evenings. The hotel is set in woodland.