

ARC101 Theory of Architecture

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Unit - 1

- Definition of Architecture
- Elements of architecture
- Space defining elements
- Opening in space defining elements
- Spatial relationship
- Spatial organization
- Primary forms
- Transformation of forms

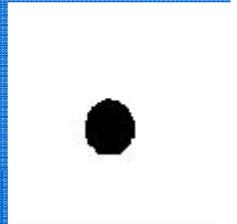
□ Definition of Architecture

1. Originated from the Greek word Architekton
2. Archi – great tekton – builder
3. Architecture is the art and science of building
4. It is the conscious creation of utilitarian spaces with the deliberate use of material
5. Architecture should be technically efficient and aesthetically pleasing.

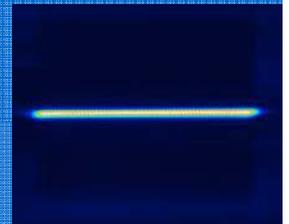
□ Elements of Architecture

PRIMARY ELEMENTS OF ARCHITECTURE

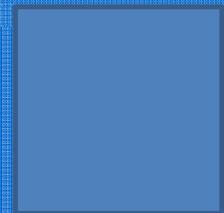
Point zero dimension . Indicates position in space.



Line 1 d – point extended becomes a line. With properties of length , direction & position.



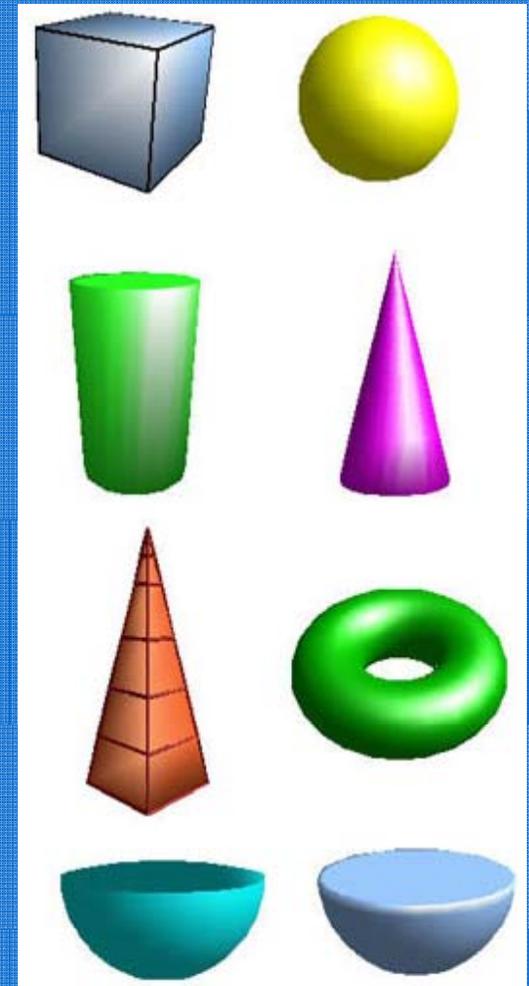
Plane 2 d -line extended becomes a plane with properties of length , width , shape , surface , orientation , position.



□ Elements of Architecture

Volume – 3 d

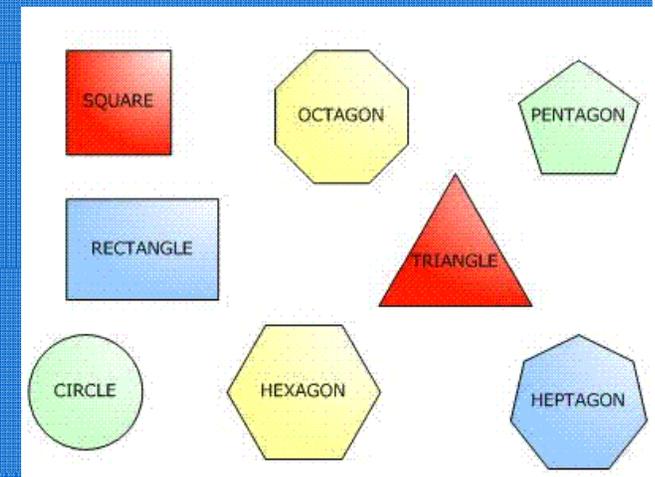
- a plane extended becomes a volume with properties and length , width , depth , form , space, surface , orientation , position.



□ Elements of Architecture

Plane –

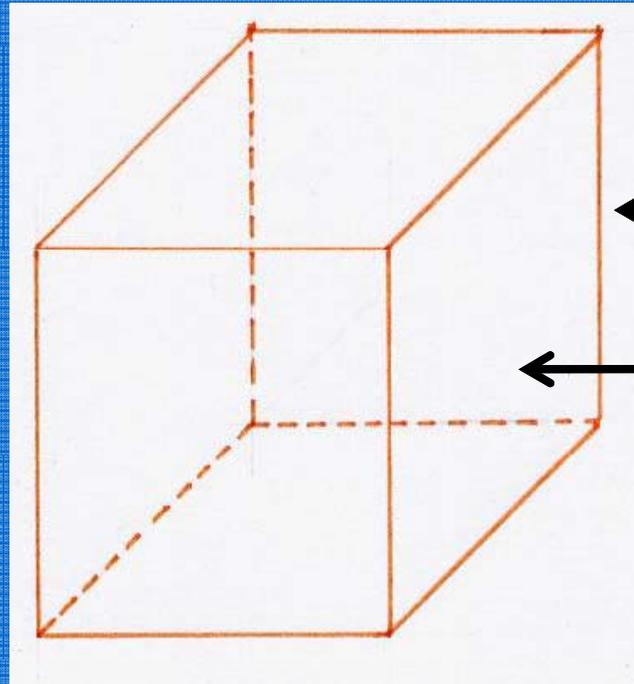
1. Shape is the primary identifying characteristics of a plane.
2. Supplementary properties are Surface, color , pattern , texture , affecting visual weight and stability.
3. Plane serves to define the limits or boundaries of a volume.



□ Elements of Architecture

Volume —

Points or
vertices



Lines or edges —
2 planes meet

Planes or
surfaces

Form is the primary identifying characteristics of a volume.

Established by shapes & interrelationship of planes.

A volume can be solid space displaced by mass or void contained by planes.

□ Elements of form defining space

In architecture we manipulate three generic types of planes



Overhead plane

Ceiling plane or
roof plane



Munich
Olympic
stadium



Wall plane

Vital for enclosure of
architecture space . Active in
our field of vision

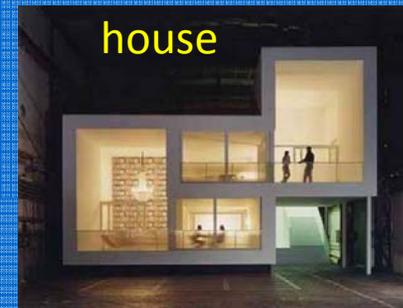


Modern interior



Base plane

With ground plane the building
can merge , rest firmly or be
elevated above it.

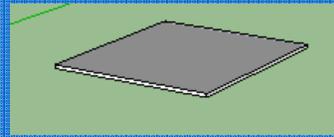


Precast construction
house

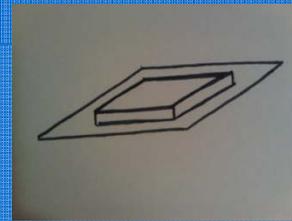
□ Elements of form defining space

Horizontal plane

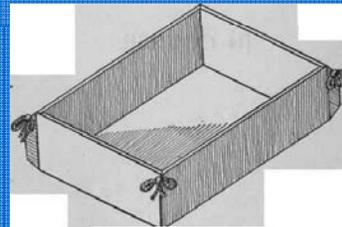
→ Base plane



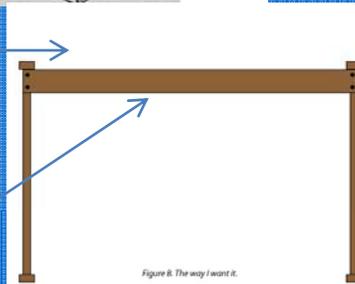
→ Elevated plane



→ Depressed plane



→ Overhead plane
roof plane
ceiling plane

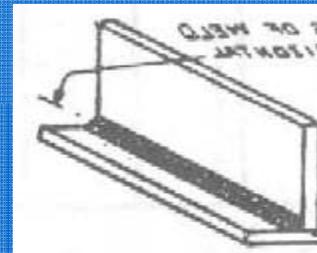


□ Elements of form defining space

→ Vertical Linear elements –define the edges of volume of space



→ Single vertical plane - articulates the space which it fronts

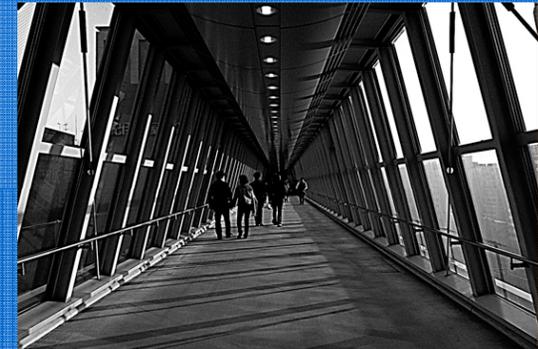


→ L- shaped plane – generates a volume of space from its center outward as a diagonal.

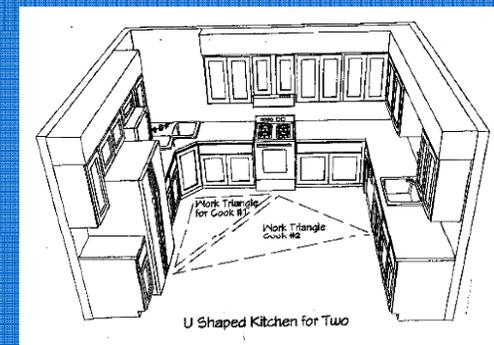


□ Elements of form defining space

→ parallel plane - define the volume of space in between that is oriented axially towards open end.



→ U shaped plane - defines the volume that is primarily oriented towards the open ends.



→ Planes closure - vertical plane on all Sides establish boundaries of an Introverted and influence the field of space around enclosure.

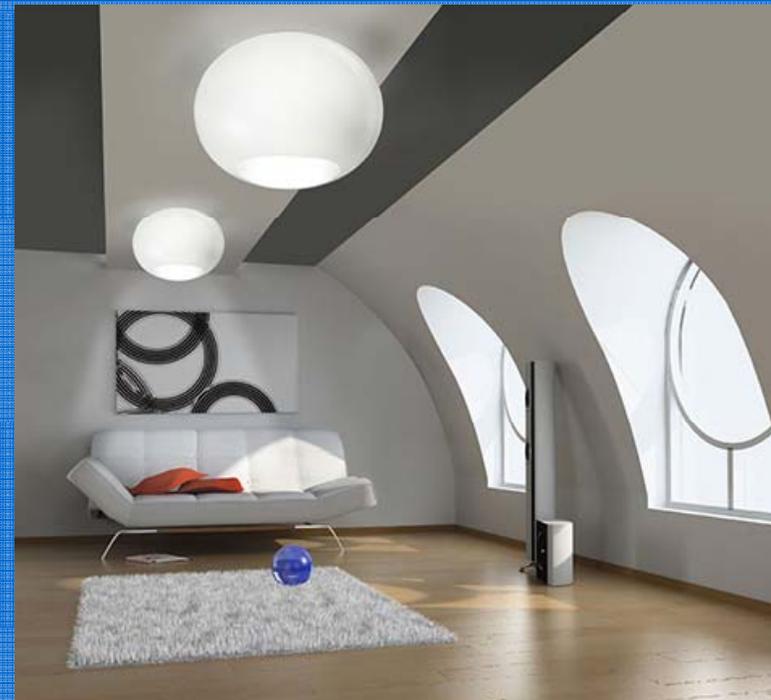


□ Elements of form defining space

Horizontal plane

Base plane

- Seems to be figured out when there is a perceptible change in color , texture .
- With edge definition
- With surface articulation – eg carpet , lawn , paving etc.



□ Elements of form defining space



Horizontal plane

Elevated Base plane

- Elevating creates a specific domain
- If surface characteristics continues up across the elevated plane , then the elevated one will appear part of surrounding plane.
- If edge conditions is articulated by a change in form ,color , texture , then the field will become a distinct plateau ,that is separated from surroundings.



□ Elements of form defining space

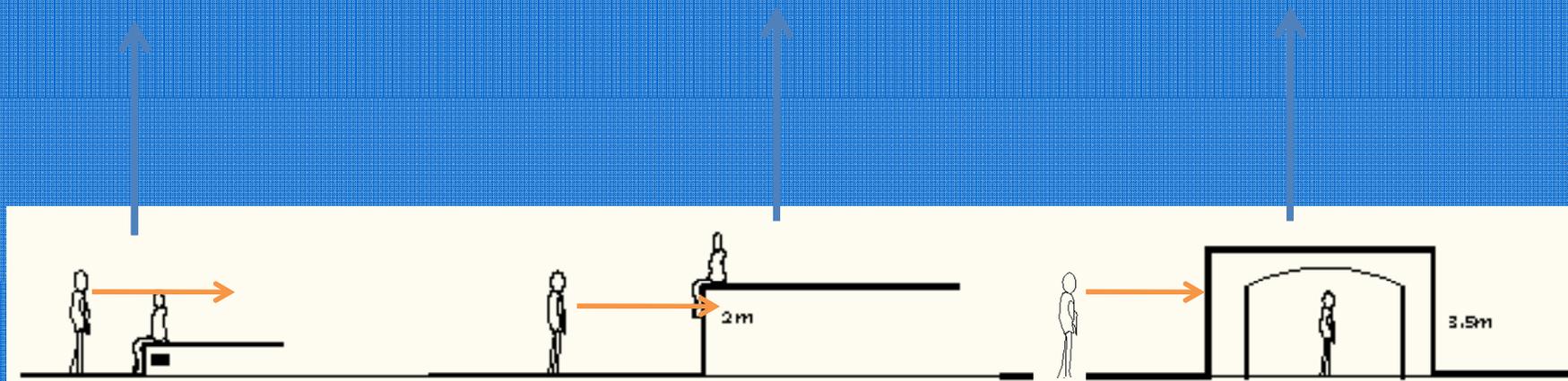
Horizontal plane

Elevated Base plane – spatial & visual continuity

Edge is well defined .
Spatial continuity
maintained. physical access
accommodated

Spatial continuity interrupted.
Visual continuity maintained.
access required stairs for physical
access.

Visual and spatial continuity is
interrupted. Elevated plane
isolated from ground level.



□ Elements of form defining space



Horizontal plane

Elevated plane

- it can be result form site conditions or constructed to elevate a building from surroundings to enhance its image in landscape.
- Used to differentiate the scared buildings or it defines any important typology.
- Elevated plane can define a transitional space between exterior and interior.
- A section floor plane can be elevated to establish a zone of space with in the large space.

□ Elements of form defining space



Horizontal plane

Elevated plane



Acropolis
Athens



Villa
savoye ,
Paris



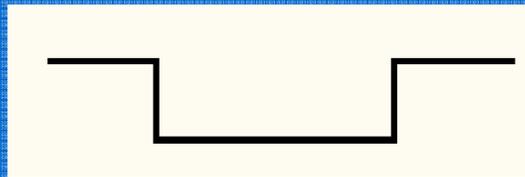
CEPT , Canteen
Area.

□ Elements of form defining space

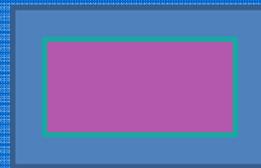
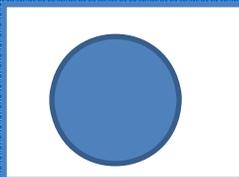


Horizontal plane

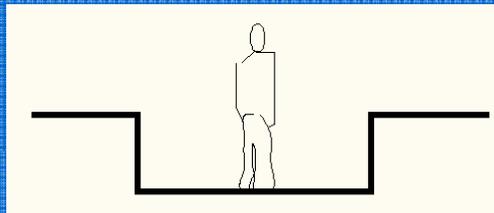
Depressed Base plane – spatial & visual continuity



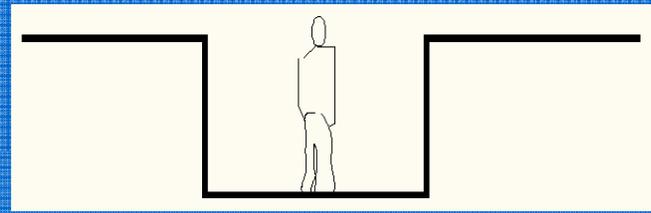
Vertical surface of depression establishes boundaries



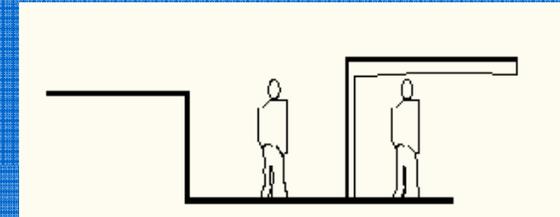
By contrasting form, geometry or orientation



Remains an integral part



The space is distinct



Separates

□ Elements of form defining space



Horizontal plane

Depressed plane



Steps down – introvert nature

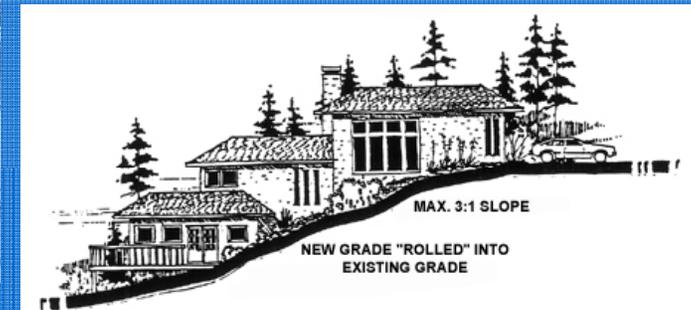


Depressed areas in topography of site – stage for outdoor arenas and amphitheater .

Depression benefits sightlines , sense of having , acoustical quality.



Steps up – extrovert nature



□ Elements of form defining space



OVERHEAD PLANE

- it is similar to the trees . It gives sense of enclosure.
- Overhead plane define a field of space between itself and ground plane.
- Edges of the overhead plane define the boundaries of this field.
- Vertical linear elements , edges of overhead plane , elevated base plan and depressed base plane aid in visually establishing the limits of the defined space and reinforce the volume.



Valencia Opera House, Spain



Salamanca House, New Zealand

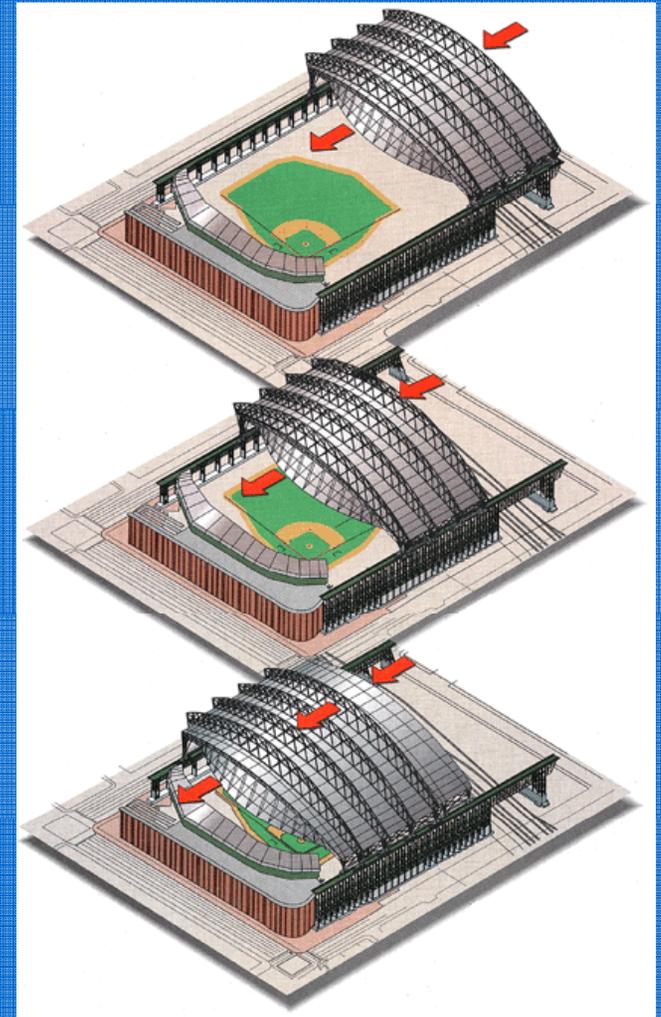
□ Elements of form defining space

OVERHEAD PLANE

- Offers protection. Determines overall form
- It is determined by the materials & structural form.
- the roof plane can visually express how the pattern of structural members resolve forces and transfer loads.
- The roof planes can be the major space defining element of the building and visually organizes a series of forms and spaces beneath the canopy.



Tensile Roof



University of phoenix , Arizona,
Indoor stadium. Retractable roof.

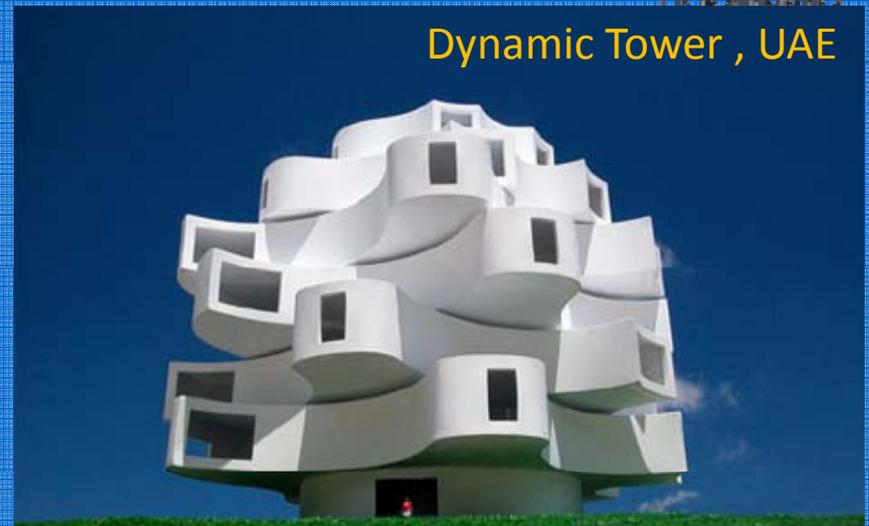
□ Elements of form defining space



Roof PLANE

- Can be hidden from view by wall or merge.
- Can be single or many
- Can extend outward as overhang
- Can be elevated to allow breeze to pass through
- Overall form can be endeavored with a distinctly planar quality by opening with vertical or horizontal edges.

Dynamic Tower , UAE

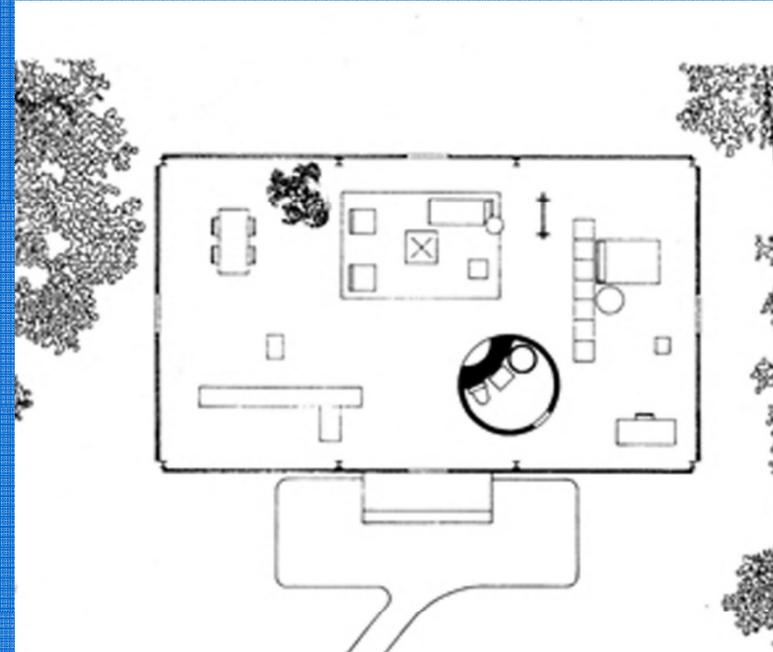


Arena Zagreb, Croatia



□ Elements of form defining space

ROOF PLANE



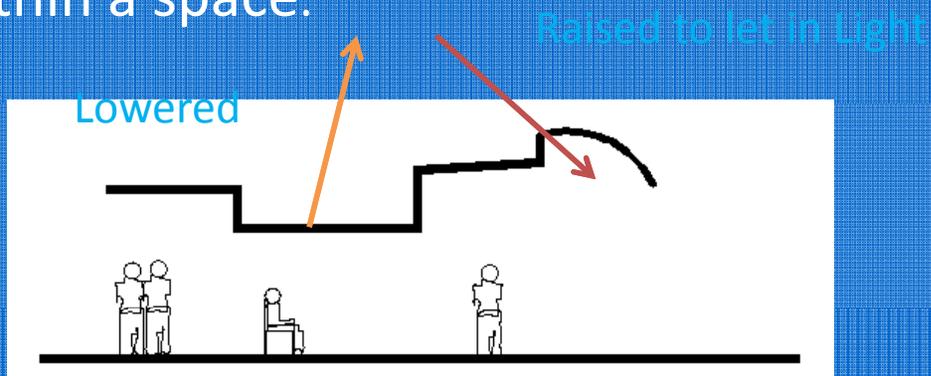
Glass House, New Canaan, Connecticut, designed by Philip Johnson, 1949.

□ Elements of form defining space



Ceiling PLANE

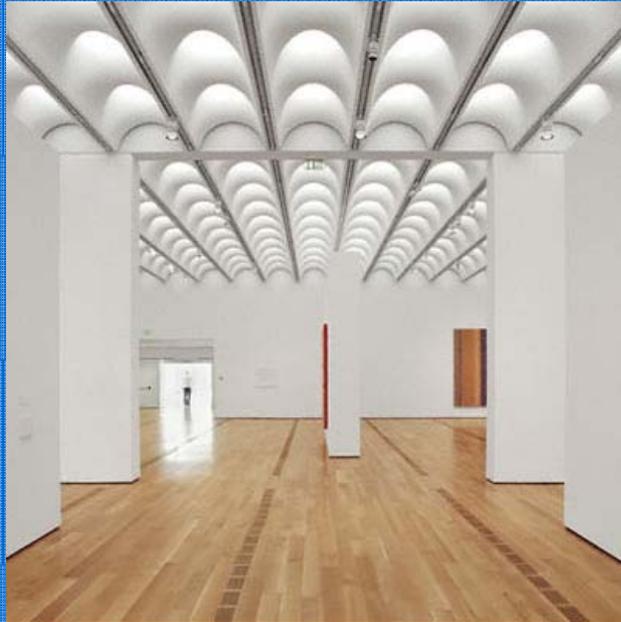
- Can reflect the form of the structural system.
- Can be detached from roof plane, suspended, underside of an overhead. Can be lowered / raised to articulate spaces.
- Can be manipulated to define and articulate spaces.
- Can be manipulated to define and articulate zone of spaces.
- Form, color, texture and pattern of the ceiling plane can be manipulated to improve the quality of light / sound / directional quality.
- Form can be manipulated to control the quality of light, sound / within a space.



□ Elements of form defining space

Ceiling PLANE

Light wave ceiling plane



UAE , Airport.



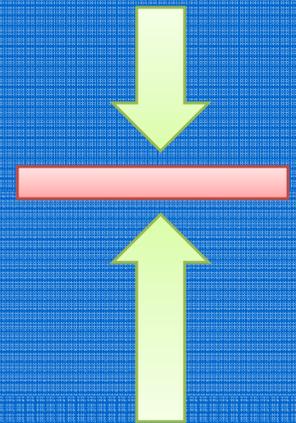
Restaurant Rosso ,
Israel

□ Elements of form defining space



Single vertical plane

- A vertical plane has frontal qualities. It has two surfaces or faces which it fronts on and establish two distinct spatial fields
- They can differ in form , color or texture to articulate different spatial conditions.
- The height of the vertical plane relative to our body height and eye level is the critical factor that effects the ability of the plane to visually describe spaces.

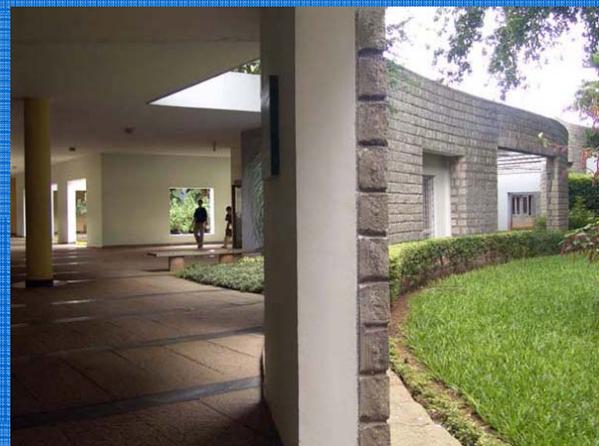


Single vertical plane

This vertical wall divides the campus and forest area.

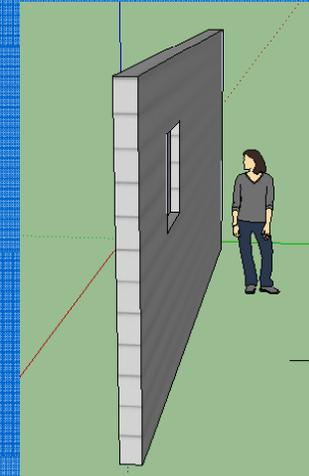
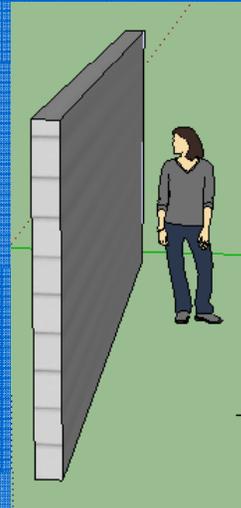
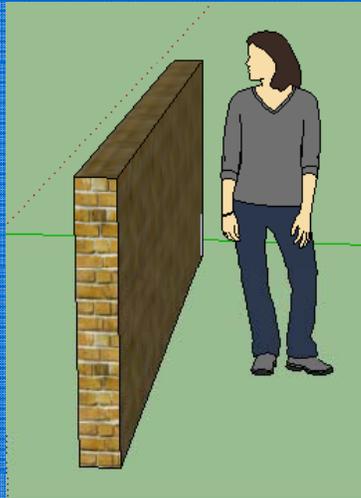
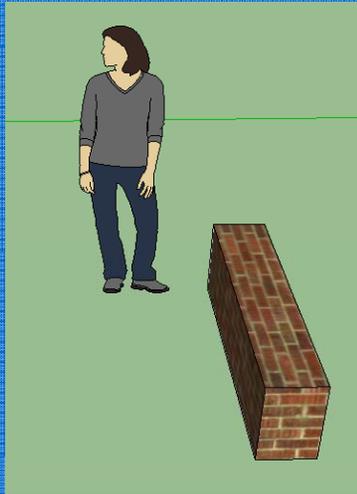


The wall establishes different spatial quality



JNCASR ,BUILDING , DESIGNED BY CHARLES C OREA , BANGALORE

Single vertical plane



Provides little or no sense of enclosure. It defines the edges of spatial field

Provides sense of enclosure. It allows visual continuity

Separates one space from another

Full sense of enclosure

Linear elements

- ❑ Vertical linear elements such as columns, obelisks and towers have been used throughout history to commemorate significance events or establish particular points in space or to organize spaces around it.
- ❑ Vertical linear elements can also define a transparent volume of spaces.
- ❑ marks the corners and edges of spaces.
- ❑ Linear members that possess the necessary material strength can perform structural functions.
- ❑ They can express movement across space.
- ❑ Stand as column supports for entablature.
- ❑ Columns and beams together form a 3d framework for architectural space.



Column of Marcus Aurelius, Rome



Obelisks in Vatican city

Linear elements

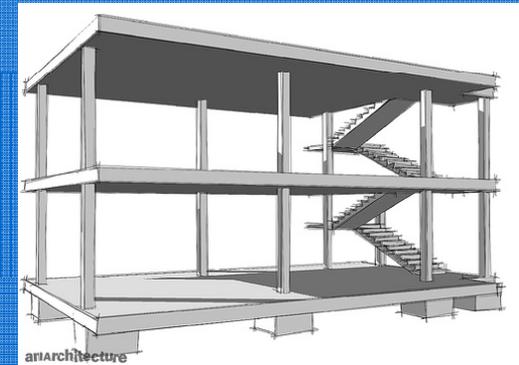
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Hagia Sophia , Istanbul



Parthenon , Greece



Domino house , LeCorbusier

Linear elements

□ A row of column supporting an entablature – a colonnade is often used to define the public face or façade of a building – advantages

- a. Being penetrated easily for entry.
- b. Offers a degree of shelter from the elements
- c. Forms a semi transparent screen the unifies individual building form behind it.
- d. Columns can define the edges of an exterior space.
- e. Articulate the edges of building mass in space.
- f. Trellis or pergola can provide a moderate degree of definition and enclosure for outdoor spaces.
- g. Allow light and breeze to penetrate.



Colonnade in ST.Peters Square



IIMB , CORRIDOR , B.V.Doshi

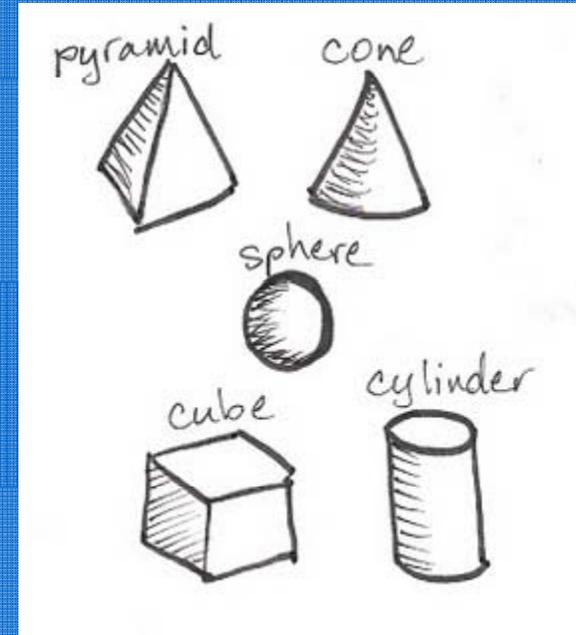
Openings in space defining elements

- ❑ Openings are required for visual and spatial continuity.
- ❑ Openings determine patterns of movement (door)
- ❑ Openings allow light to penetrate the space (window)& illuminate the surface of a room.
- ❑ They offer views from the room / interior to exterior.
- ❑ They establish visual relationship between rooms and adjacent spaces.
- ❑ They provide natural ventilation.
- ❑ Depending on size , number and location they can weaken the enclosure.



PRIMARY SOLIDS

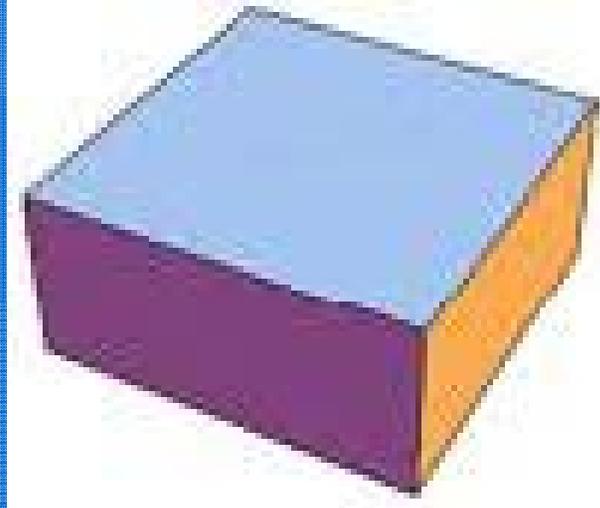
- SPHERE
- CYLINDER
- CONE
- PYRAMID
- CUBE



PRIMARY SOLIDS

- SPHERE





CUBOID



CUBE



•PYRAMID



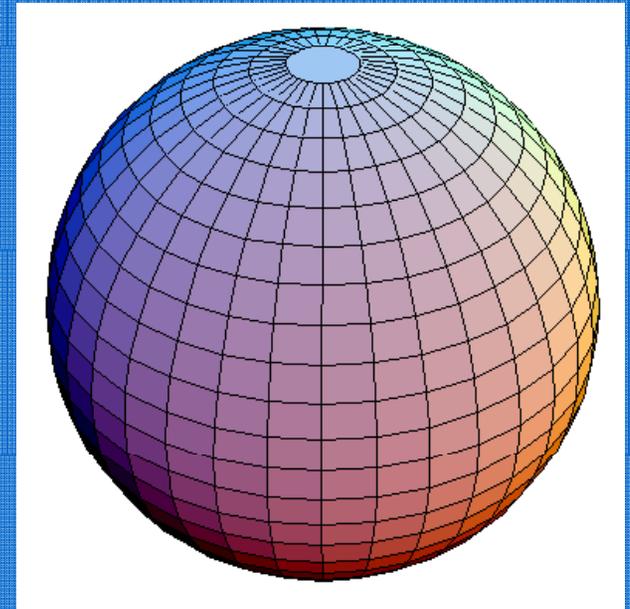
CONE



CYLINDER

Sphere

- Sphere is body that consists of regular , continuous surface.
- It has no lines , edges or corners
- Neither horizontal or vertical emphasis
- It is a form which is closed within itself.



SPHERE BUILDING , SHANGHAI



Visual effect

- Pure convex form externally
- Presents impenetratable , uninviting appearance.
- It displays visual quality of repulsion .
- Has no points of interest to focus
- Defined by vague outline of circle , whole mass appears as immense dot.

FLOATING PAVILION FOR SHANGHAI



Emotional effect

- Lack of concentration
- Restlessness
- Diffuseness
- This diffuseness also characteristics the external space surrounding the sphere.
- Total effect on observer. Is lack of sense of orientation

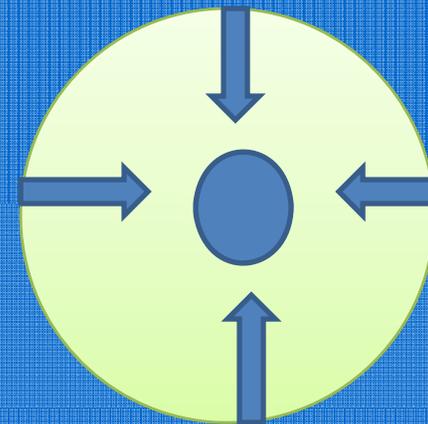
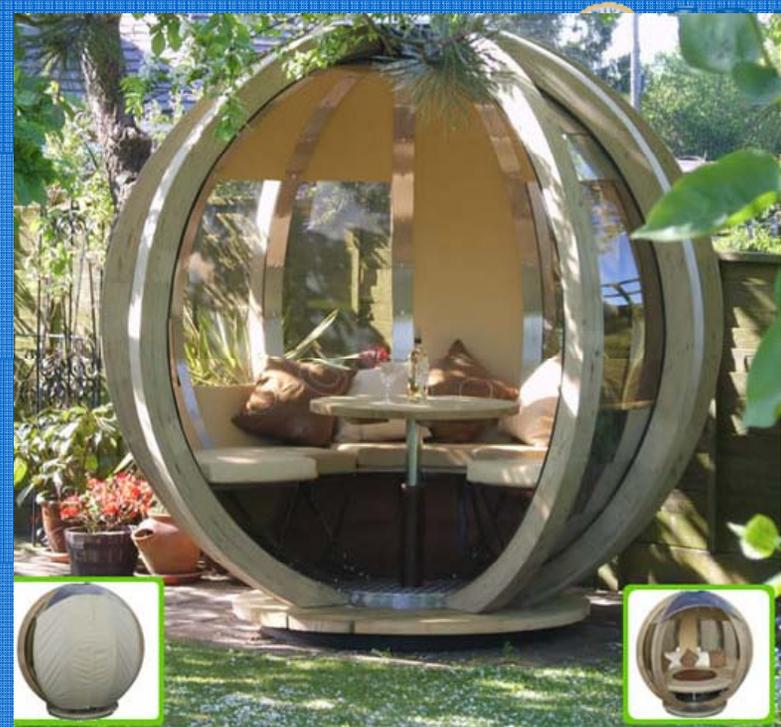


FLOATING PAVILION FOR SHANGHAI



Inside the sphere

- There is a dramatic change inside.
- The bounding surface is continually concave.
- It opens to the observer.
- Invites attention.
- Attraction is from all sides
- This results in equilibrium of forces.
- Center of this equilibrium is center of sphere .the center is imaginary.



Emotional effect

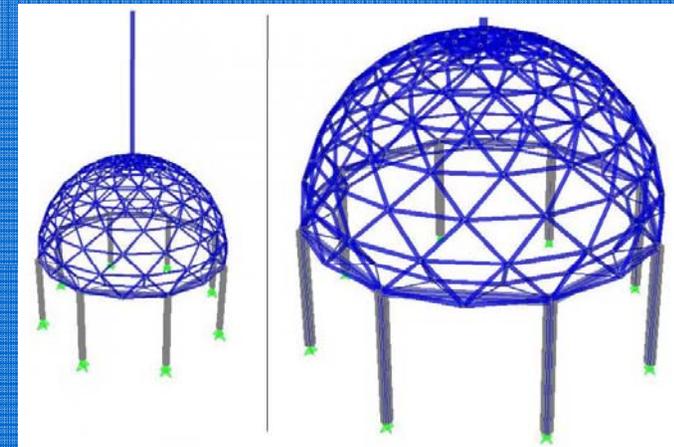
- It arouses sensations of Concentration , repose and orientation.



HOUSE IN SWEDEN

Derivatives of sphere – Hemisphere

- Cut horizontally in half.
- Cut portion forms an edge , circular in plan.
- The dome and the edge portion give the visual character





Lucky Coin' Building , china

the world's most unusual structure - a cylindrical coin-shaped building that is currently being constructed on the banks of the Pearl River.



Al Dar Headquarters | MZ Architects PLACED IN ARCHITECTURE

the circular shape in architecture:

The Circle symbolizes unity, stability, rationality. It is also the symbol of infinity, without beginning or end, perfection, the ultimate geometric symbol. It represents a completeness which encompasses all space and Time.

Hemisphere

- A sphere cut horizontally in half.
- The cut portion forms an edge, circular in plan.
- The dome and edge portion gives the visual character.

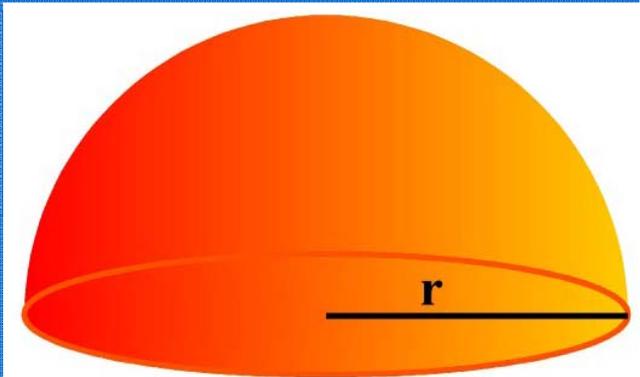


Visual effect

- Diffuse quality in the sphere, but continuity is terminated at rim.

Emotional effect

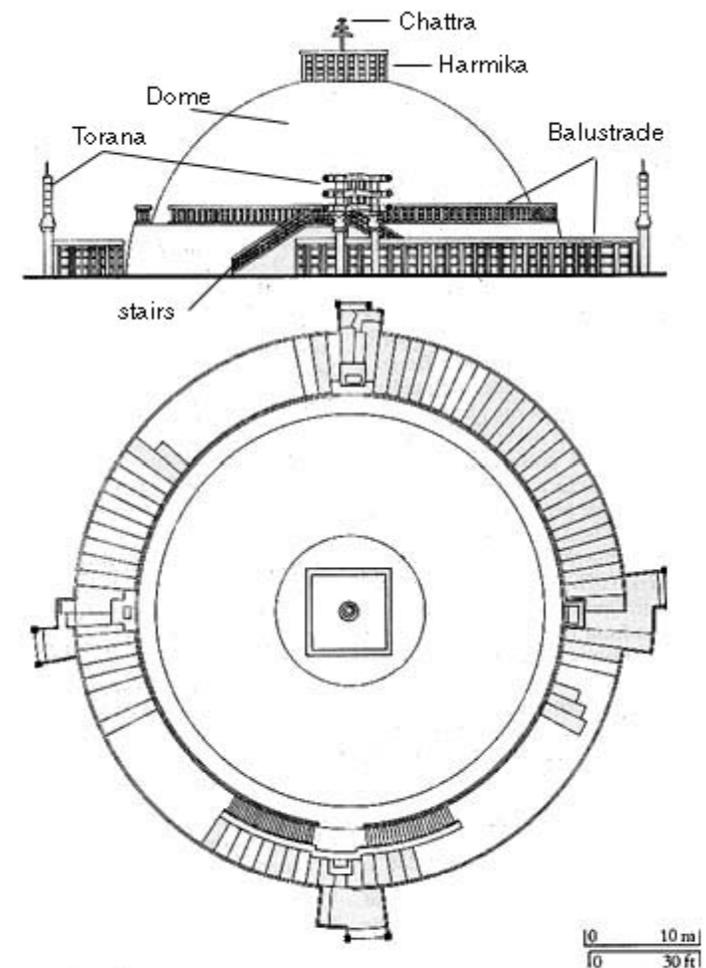
- A sense of circular movement set up by the rim.
- While sphere leads to disorientation hemisphere leads to circular movement.



Hemisphere

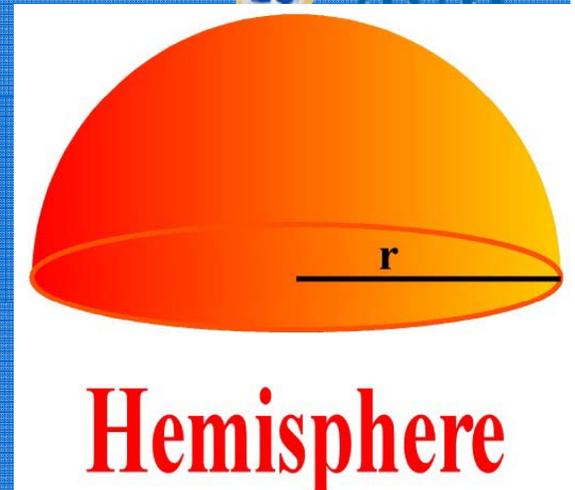
- Location: Sanchi, Madhya Pradesh
- Founded By: Maurya Emperor Ashoka
- Founded In: 3rd century BC
- Status: UNESCO World Heritage Site

- It is a simple hemispherical brick structure, which has been built over the relics of Lord Buddha. Surrounding the main Sanchi Stupa is a path, used for circumambulation.



Internally

- One concave surface and other flat
- Interior is circular in shape.
- The attention to the observer will be to the center. Which can be visually identified.
- But the experiences a sense of movement is associated with the edge.



Inverted hemisphere

- If the base is flattened it would be horizontal arena towards the which attention is focused.
- This would be idea for viewing a centrally activity such as sporting events.



Roman arena

OPENINGS

- Interrupt continuity of the domical surface.
- Decrease the visual impact .
- Weakens rim.
- Separation of internal and external spaces is less.
- Center of interior visible form outside draws observers to the interior.
- From the interior , outside catches the attention.
- Hence the attention constantly fluctuates between inside and outside leading to mild visual excitement.



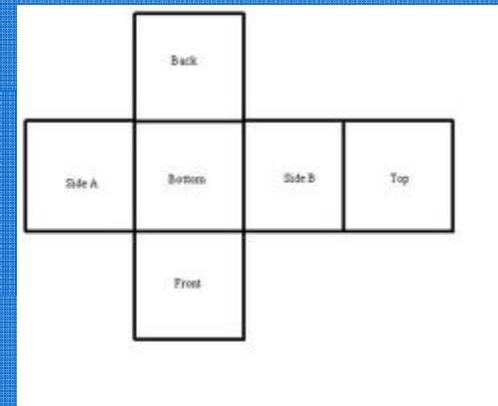
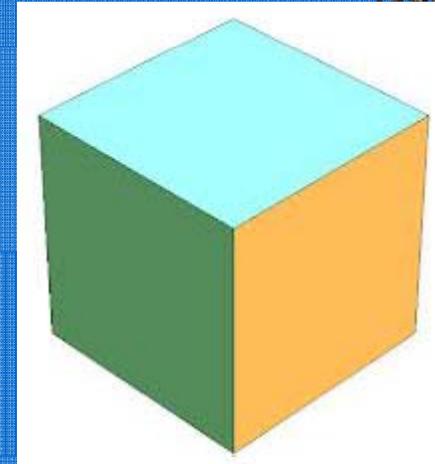
Australian Academy of Science building in Canberra



The St. Louis Gateway Arch in Missouri is one of Missouri's oldest public memorials and the tallest monument of its kind in the United States. The Gateway Arch is 630 feet tall and 630 feet wide at its widest point.

CUBE

- Six equal square sides
- Angle between any two adjacent faces being right angle
- Cube is static form .
- It is very stable unless it stands in corners.
- The cube remains a highly recognizable form.



VISUAL EFFECT

- The vertical blank square neither invites nor repulses .visually and physically impenetrable , uninviting appearance.
- Because the directions are equally emphasized , the mass as a whole has no directional quality and neutral.
- Visual force is given by edges.



INSIDE CUBE

- Space inside cube is bounded in plane surface , lines and corners.
- Corners wont project towards the observer but recede away from him.
- When it is treated little bit , it grasps the attention than others



Falling water in
Pennsylvania

Cuboid

Altering the equal sides of the cube, cuboid is obtained.

The volume is spread in particular direction either horizontal or vertical, irrespective of the surface.

Each mass has a longer side and shorter side.

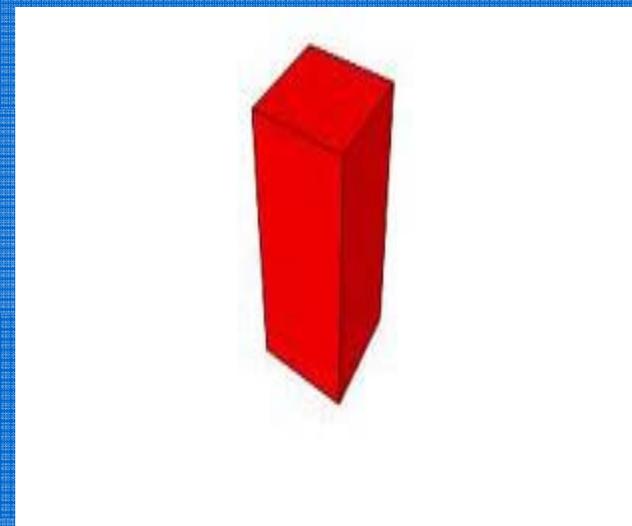
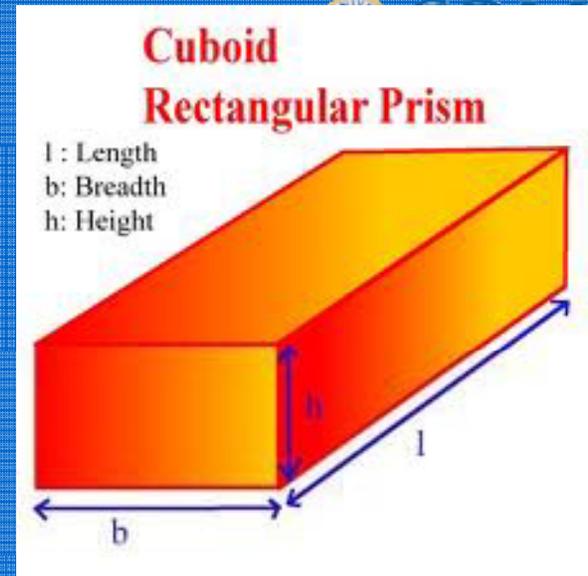
Surface lines are emphasized than corners.

Horizontality – urban street.

(because of the continuity one hesitates to stop unless opening is created)

Verticality – high rise building

(both physical and visual tension makes it dominating visual entity)





Street in Dublin



Apt in las vegas



The horizontal internal space stimulates a horizontal movement , which is greater with increasing horizontality. So space becomes transformed into a passage , a corridor and an internal street.

Vertical space stimulates vertical movement when filled with stair case, lift or ramp.

Water Cube, also known as the National Aquatics Center



The Water Cube's design was a Team Masterpiece: the Chinese partners felt a square was more symbolic to Chinese culture and its relationship to the Bird's Nest stadium, while the Sydney based partners came up with the idea of covering the 'cube' with bubbles, symbolizing water.

It should be noted that contextually the cube symbolizes earth whilst the circle (represented by the stadium) represents heaven.



The Zollverein School , Germany

- Organization of the openings, windows in three different sizes, create an unusual interaction with the surroundings and the interior.
- The building has four floors with ceilings of varying height as well as a roof garden. The idea of stacking open floor plans was developed in compliance with the demands made by the various functions.



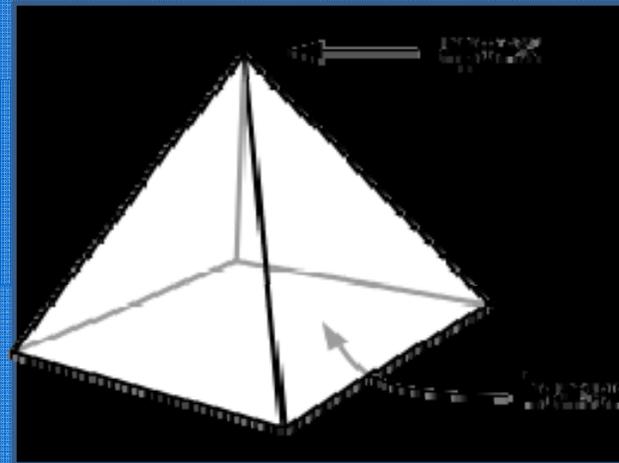
The Cube Condo Hotel , DUBAI

It's located in Dubai Sports City, has 27 floors and 561 luxury condos that will satisfy even the pickiest tourists.



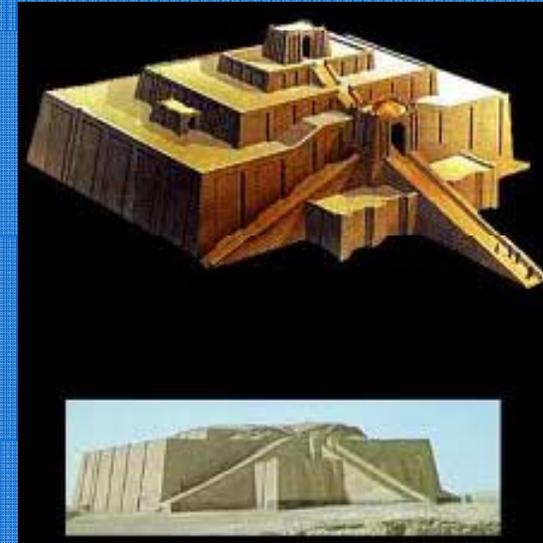
Pyramid

- Made up of tapering and inclined surface and gather together to form an apex , a corner where the whole mass culminates.
- Eye wil travel towards the corner.
- The directional quality is stronger than that of a rectilinear tower.
- Pyramidal form shows the devotional character.

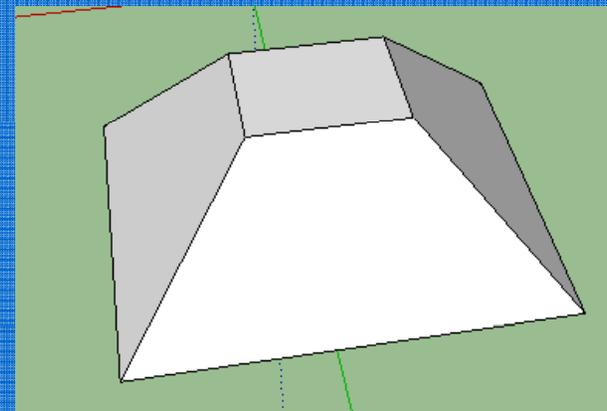


SECTION OF THE PYRAMID

- Flat topped pyramid , reminiscent of Sumerians and Mayan forms.
- Accumulation of force at the upper edge ,which encloses the square plateau above and hold it in a kind of visual field force.
- Any major activity taking place upon it will appear to posses a heightened importance to those below and strongly attract their attention.

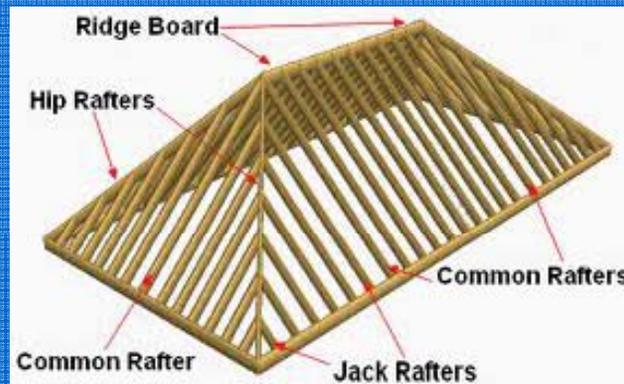
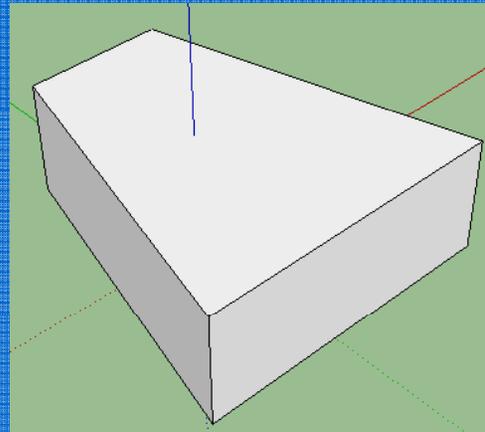


ZIGGURAT



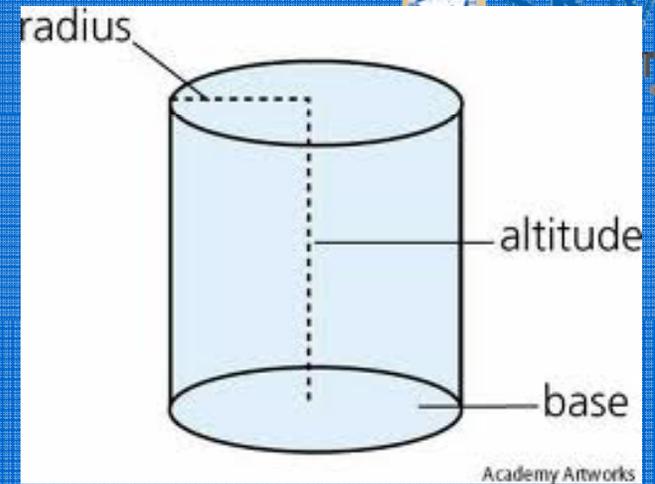
Derivatives of pyramid

- Fan shape helps of audi and cinema theater . One end helps for natural screen and expanded side for viewers.
- Acoustically good and helps for good viewing angle.
- Pitched roof for dwellings to throw of rain water



cylinder

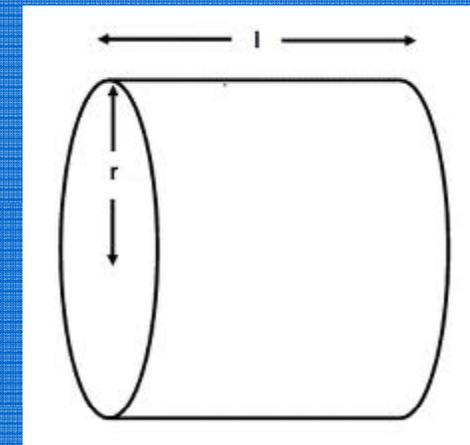
Rounded surface. In far distance it appears in outline as rectilinear and nearer it appears more like circular.



Nehru Centre , Mumbai



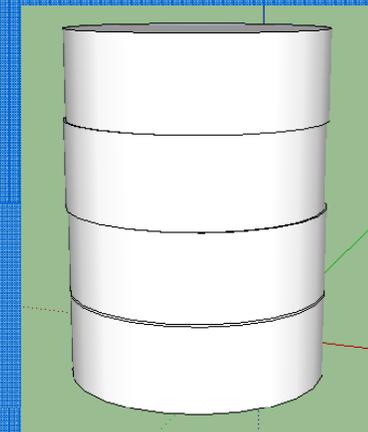
BMW Headquarters , Munich



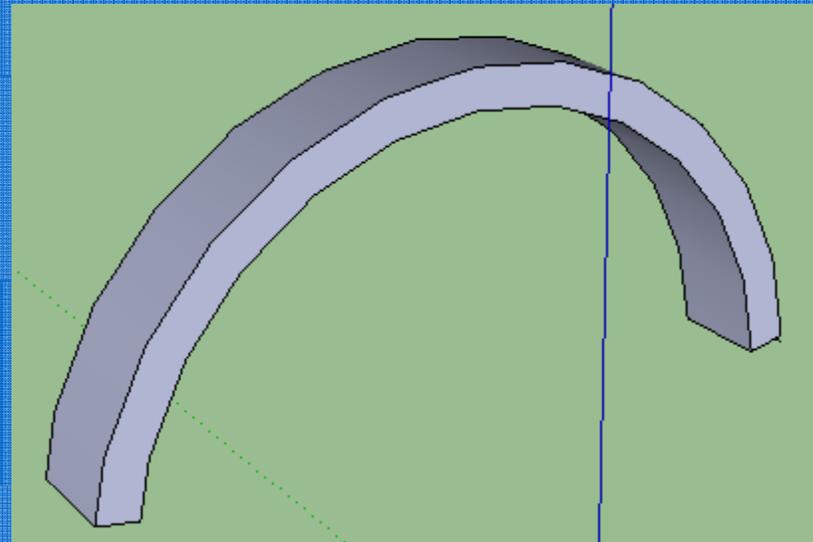
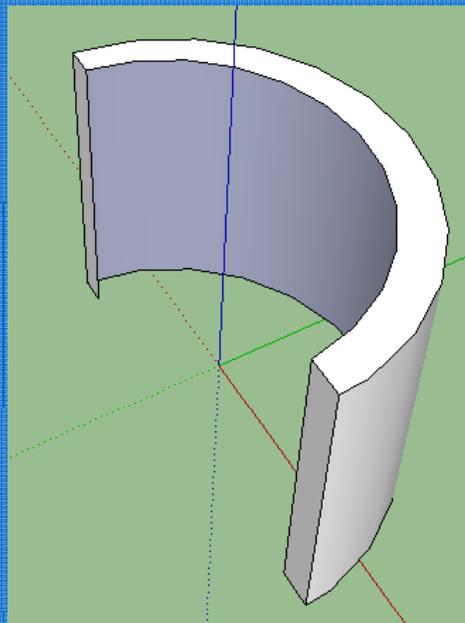
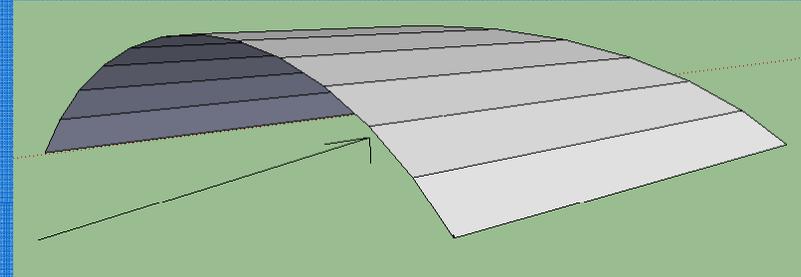
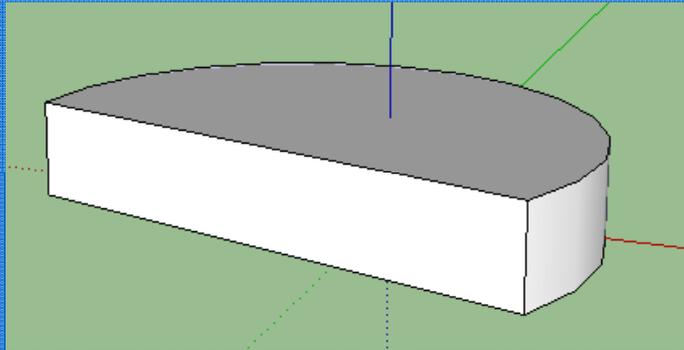
Curvature and circular movement continue alongside a strong vertical movement. the resultant is spiral. spiral ramp and spiral stairs suits a space.



Solomon R. Guggenheim Museum, New York.



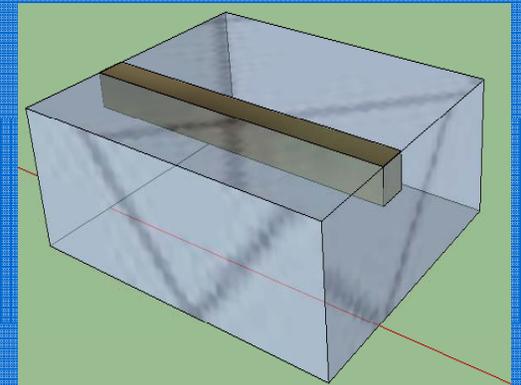
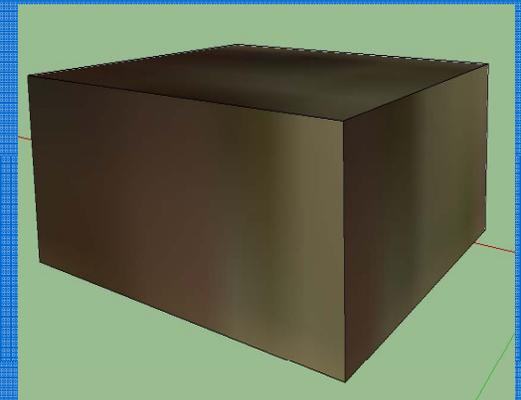
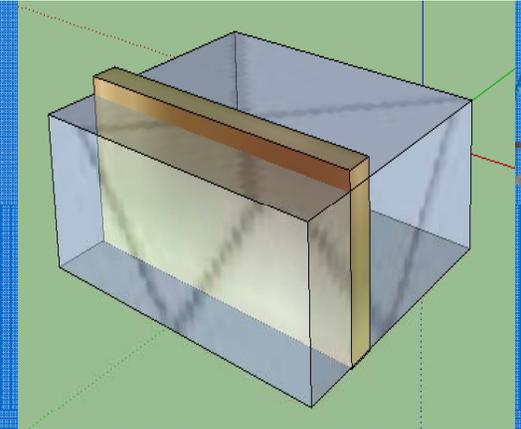
Sections of cylinder



Transformation of forms

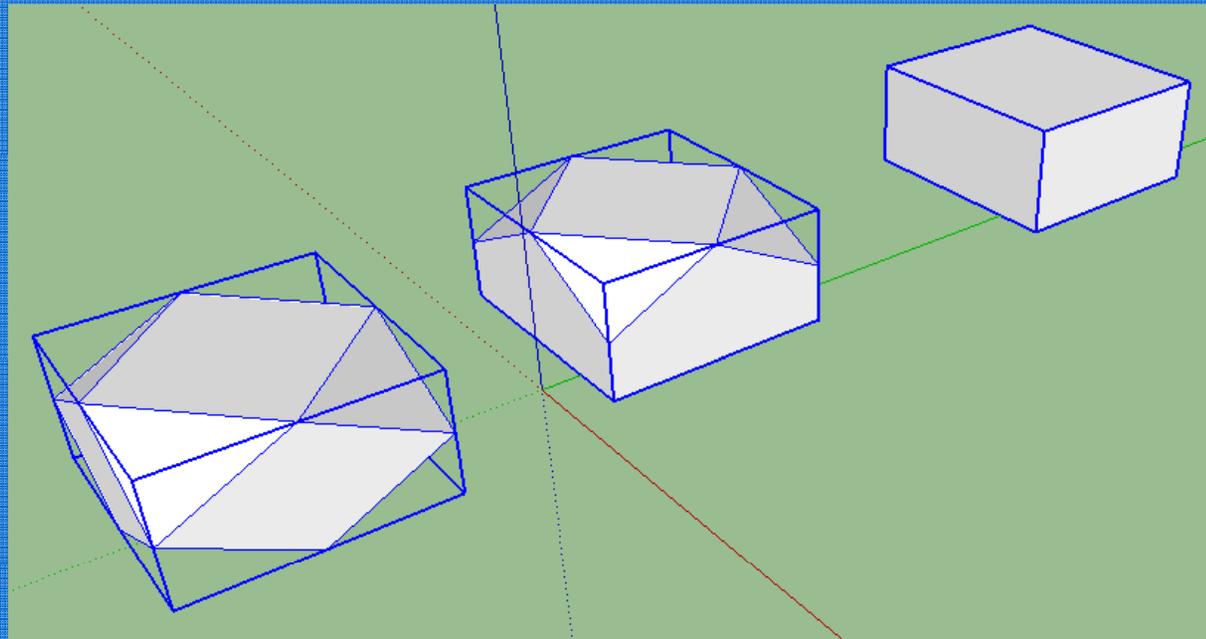
Dimensional transformation

- A form can be transformed by altering one or more of its dimensions and still remains its identity as a member of family forms.
- A cube can be transformed into similar prismatic forms through discrete changes in height , width or length.
- It can be compressed into a planar form or be stretched out into a linear form.



Subtractive transformation

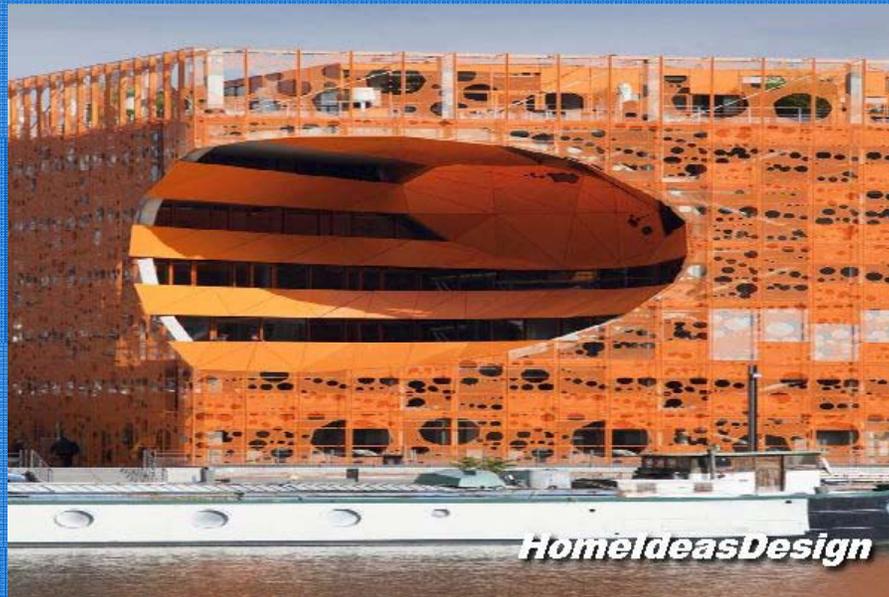
Form can be transformed by subtracting a portion of its volume. Depending on the extent of the subtractive process, the form can retain its initial identity or be transformed into a form of another family.



Jakob + Macfarlane: orange cube

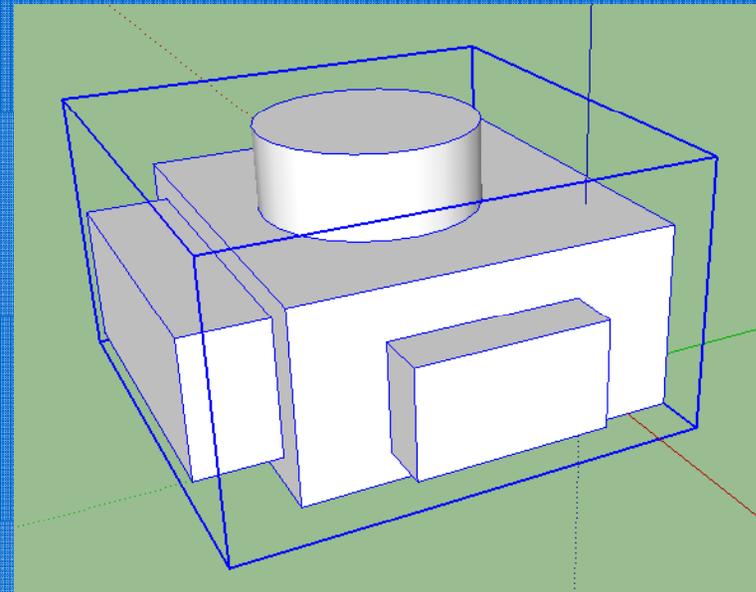
The five-storey orthogonal cube plays off the fluid movement of the river saône, exploring the effects of subtraction and voids on the quality and generation of space.





ADDITIVE TRANSFORMATION

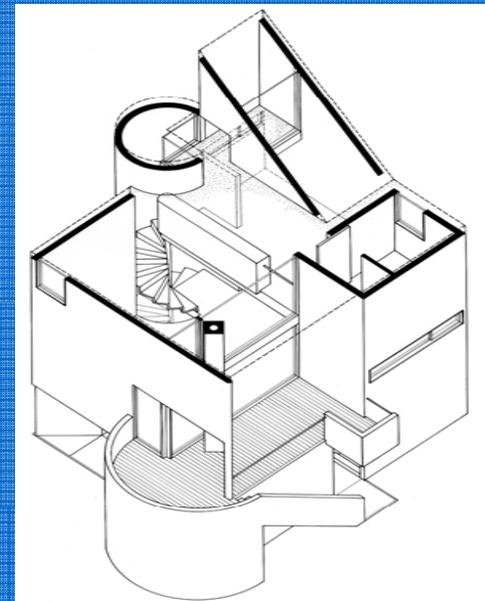
- A form can be transformed by the Addition of elements to its volume.
- The nature of the additive process & the number and relative sizes of the elements being attached determine whether the identity of the initial form is altered or retained.



GWATHMEY RESIDENCE AND STUDIO , New York

structures are composed of primary, minimal geometric forms that appear to be carved from a solid volume rather than constructed as an additive, planar assemblage. They are manipulated in response to site, orientation, program and structure.

Gwathmey Residence and Studio
Amagansett, New York

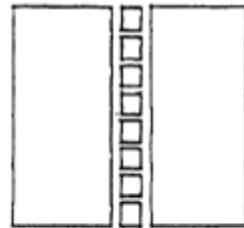


ADDITIVE FORM – TYPES



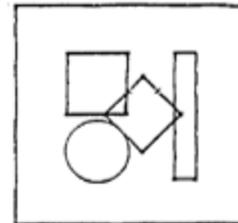
CENTRALIZED

A central dominant space about which other secondary spaces are grouped



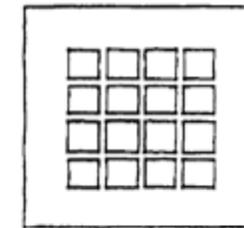
LINEAR

A linear sequence of repetitive spaces



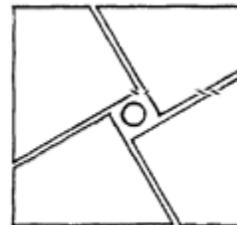
CLUSTERED

Spaces grouped by proximity or the sharing of a common visual trait or relationship



GRID

Spaces organized within the field of a structural grid or another 3 dimensional framework



RADIAL

A central space from which linear organizations of space extent in a radial manner

SPATIAL ORGANIZATION



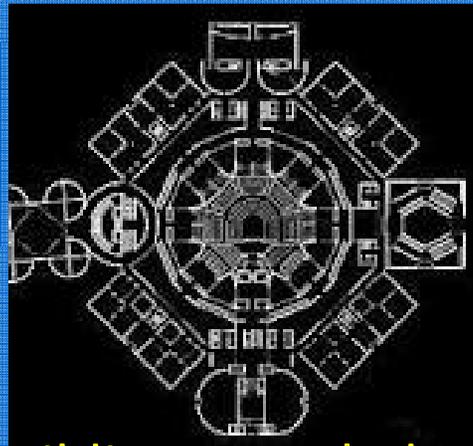
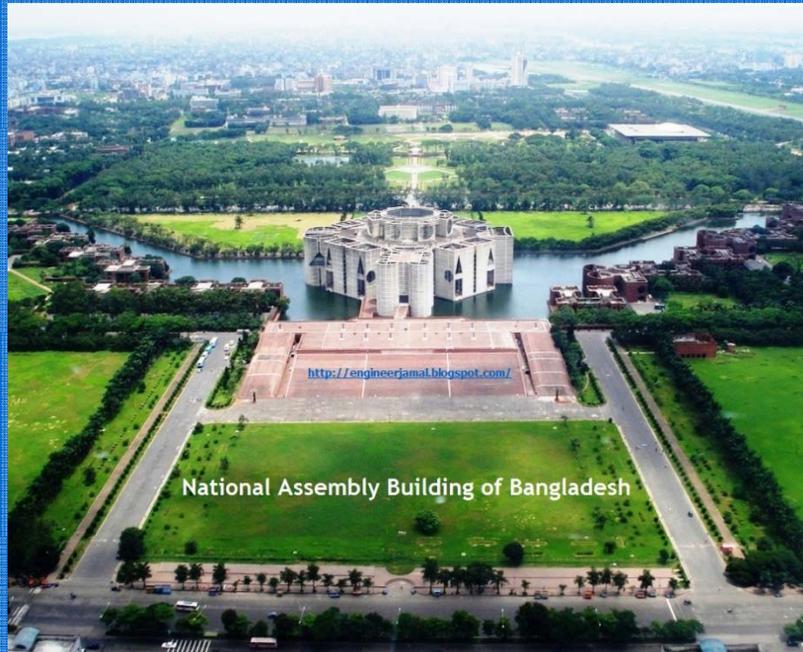
There are five types of spatial organization:

- 1. Central Organization**
- 2. Linear Organization**
- 3. Radial Organization**
- 4. Cluster Organization**
- 5. GRID Organization**

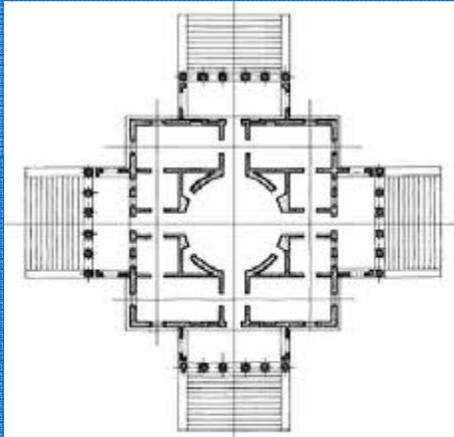
Central Organization



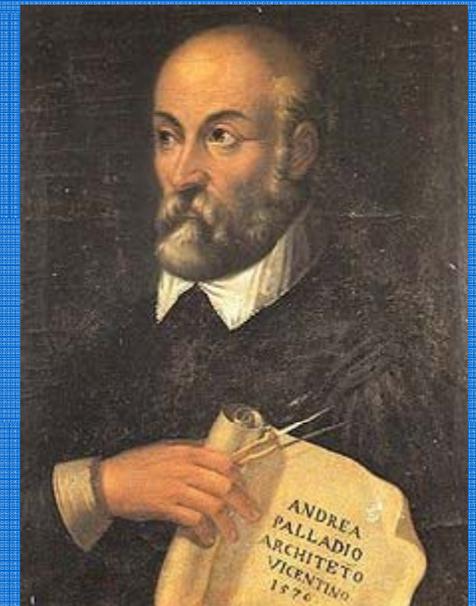
- It is a stable & concentrated composition
- It consists of numerous secondary spaces that are clustered around a central, dominant & bigger space.
- It presents secondary spaces that are equal in terms of role, shape & form, which creates a distribution package that is geometrically regular to two or more axes.
- Those central organizations whose forms are relatively compact & geometrically regular can be used to :-
 - Establish "places" in space,
 - Be term of axial compositions,
 - finally act as a form-object inserted into a field or an exactly defined spatial volume.



National assembly building ,Bangladesh , Louis Khan.



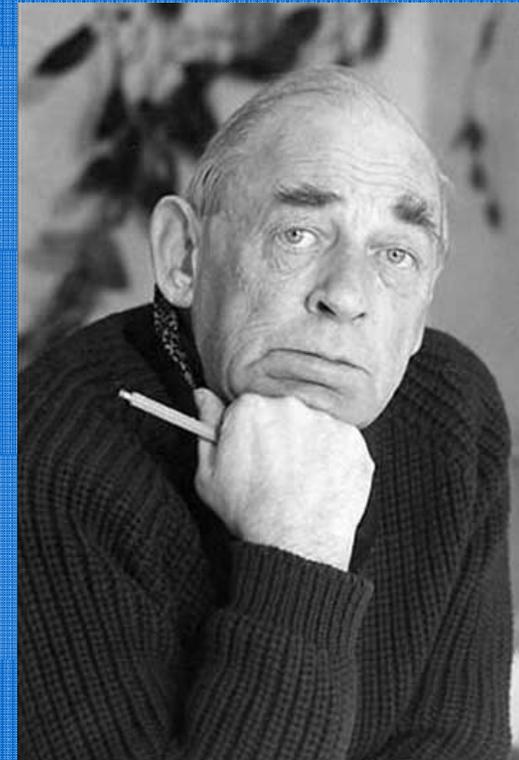
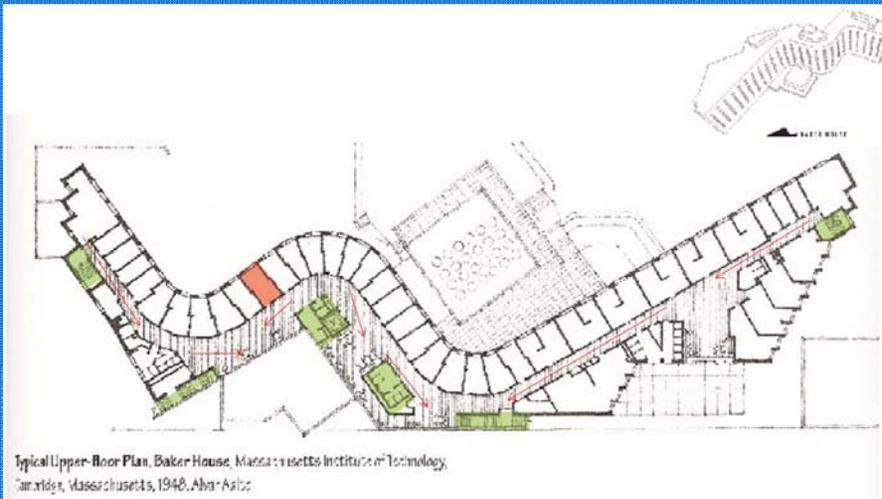
Dominant central form – sphere , cylinder , cone etc.
Eg- Villa capra , Italy , Andrea Palladio.



Linear Organization



- Consists essentially of a series of spaces.
- These spaces can be interconnected directly, or be linked through another linear independent and distinct space.
- Those spaces that are important, functionally or symbolically within this organization, can take place anywhere in the linear sequence and show their relevance using their size and shape.
- The organization can solve linear different conditions at the site.
- It can be a straight, segmented or curve line and it can develop itself horizontally, vertically or diagonally.
- The linear organization can relate itself with other forms of its context connecting them, working as a barrier to separate things and surrounding them to create a space field.



Baker House , M.I.T , Massachusetts , Alvar Alto.

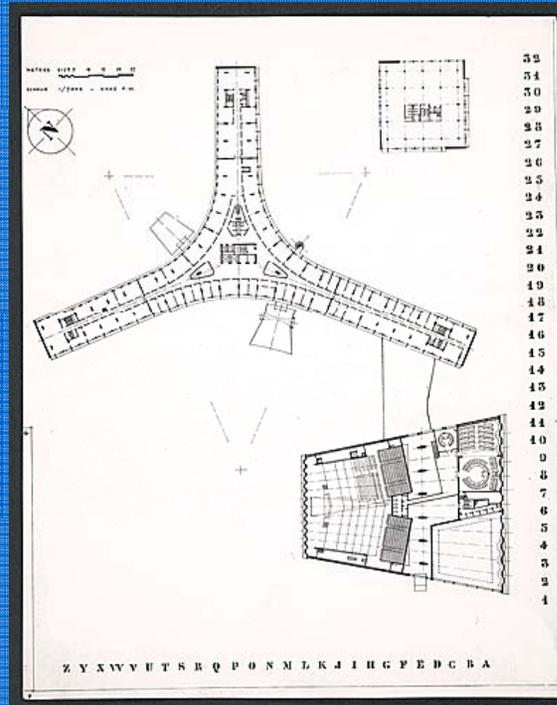
Radial Organización

It combines elements of both linear and centralized organizations. It consists of a dominant central space, with many radial linear organizations.

While a centralized organization is an introverted scheme that directs to the interior of its central space, a radial organization is an extrovert scheme that escapes from its context.

The central space of a radial organization has a regular form, acts as the hub of the linear arms and maintains the formal regularity of the whole organization.

- Extroverted in nature .
- Relate to or attach themselves to specific features of a site.
- Exposed to sun , wind , view.



Secretariat Building ,UNESCO Headquarters
,Paris, Marcel Breuer

CLUSTER Organization

This type of spatial organization is used to connect spaces using proximity.

It can accommodate in its composition spaces with different sizes, shapes and functions, as long as they relate themselves by proximity and some visual element.

The connected spaces can be grouped gather around a large area or a well defined spatial volume.



- interlock their volume and merge into a single form having variety of faces.
- Contains spaces which have common properties – shape , size, texture

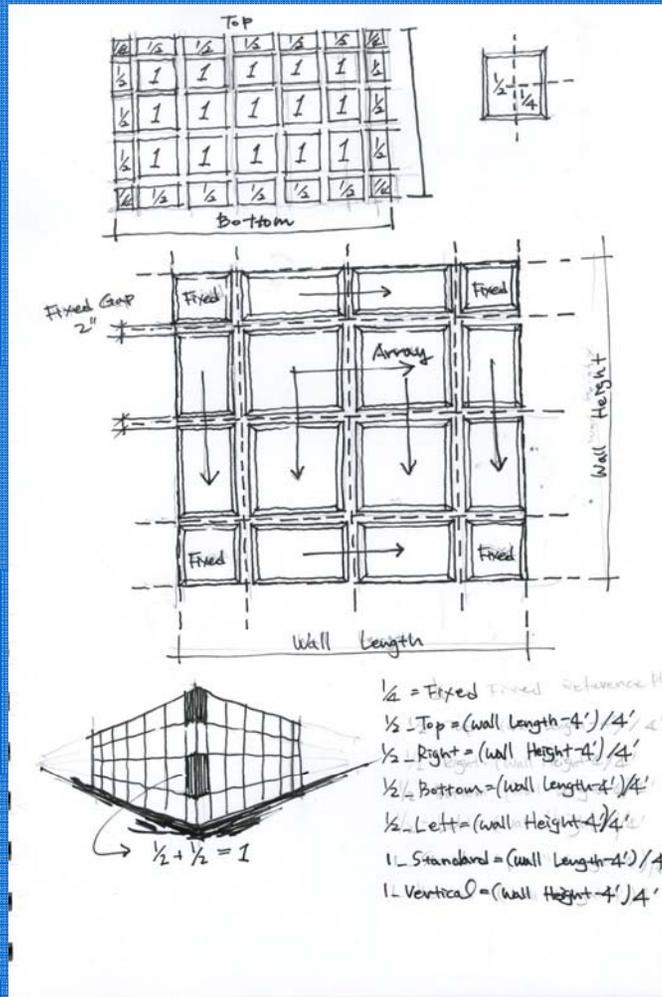


Habitat Israel , Jerusalem , Moshe Safdie

GRID ORGANIZATION



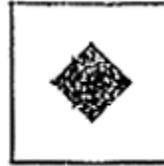
- It consists of forms and spaces whose position in space and their interrelationships are regulated by a type of plot or a three-dimensional field.
- It can be created by establishing a regular scheme of points that define the intersections between two groups of parallel lines.
- Its capacity on organization is the result of its regularity and continuity that includes the same elements that distributes.



The Gunma Museum of Fine Arts is an Art Muesum designed by Arata Isozaki JAPAN.

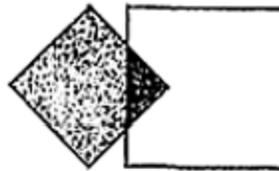
SPATIAL RELATIONSHIP

SPACE WITHIN A SPACE



A large space can envelope and contain a smaller space within its volume. Visual and spatial continuity between the two spaces can be easily accommodated.

INTERLOCKING SPACES



An interlocking spatial relationship results from the overlapping of two spatial fields and the emergence of a zone of shared space. Each space interlocking retains its identity. But the intersection of the two spaces is subject to a number of interpretations.

ADJASCENT SPACES



Adjacency is the most common type of spatial relationship. Each space is clearly defined.

SPACES LINKED BY A COMMON SPACE



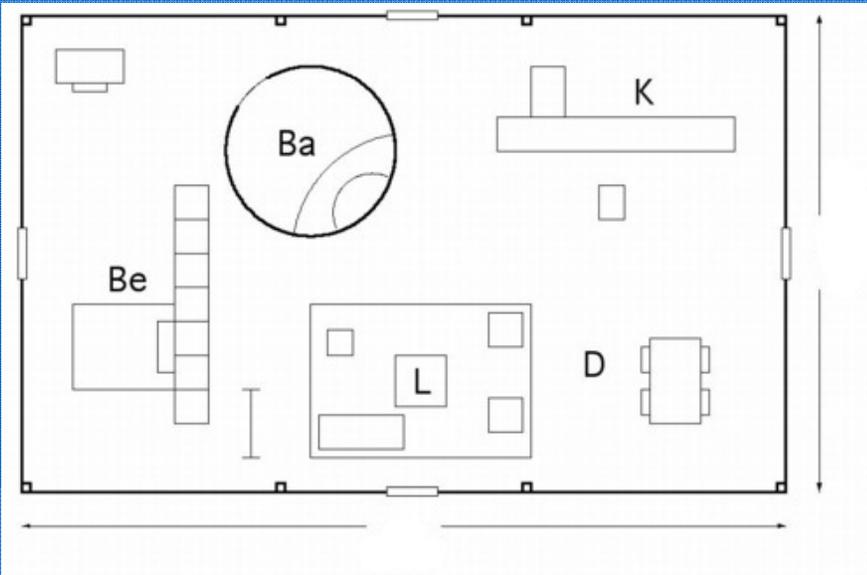
Two spaces which are separated by distance can be linked or related to each other by a third, intermediate space. The visual and spatial relationship between the two spaces depends on the nature of the third space.

Regular and irregular forms



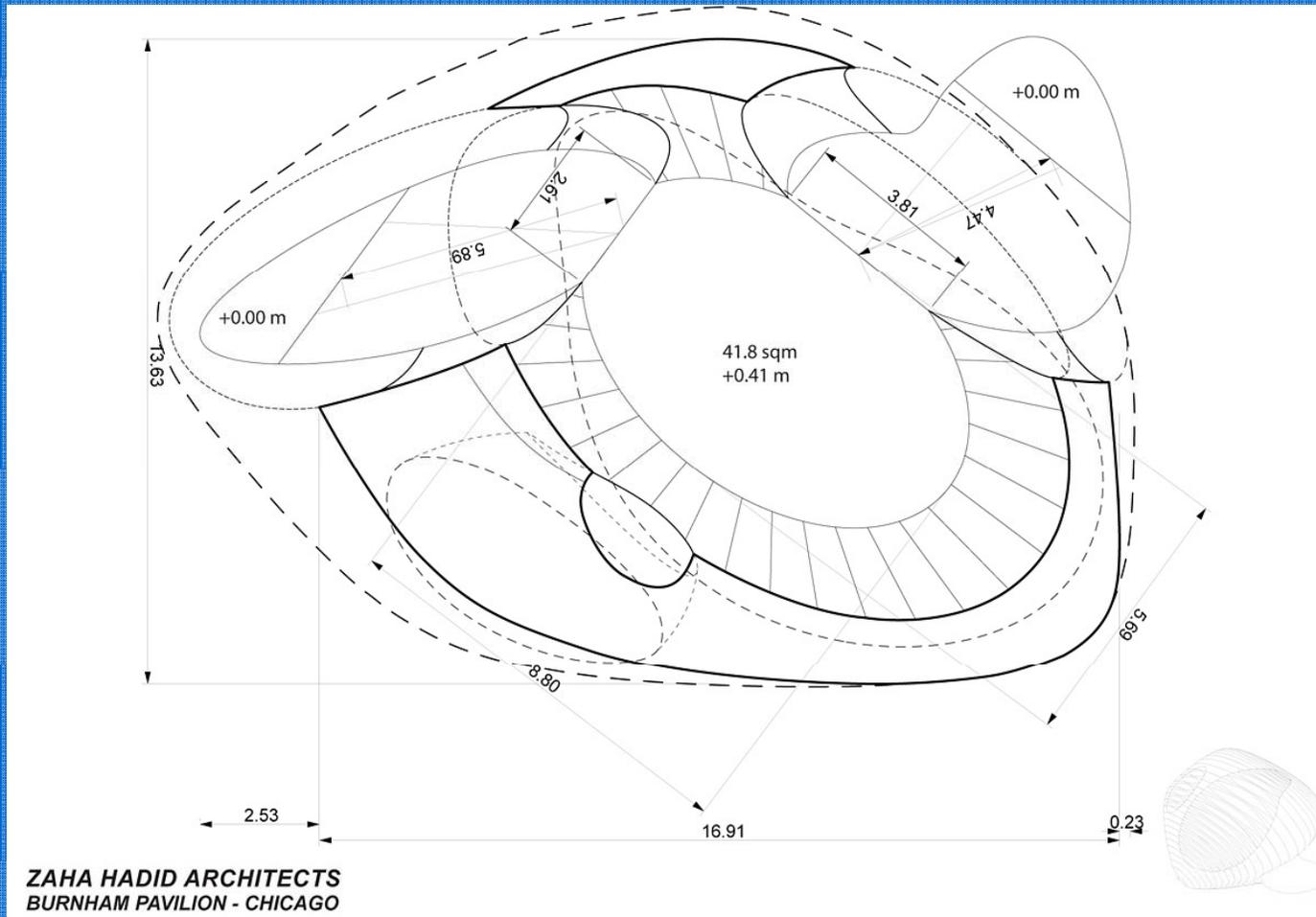
- Regular forms refer to those whose parts are related to one another in a consistent and orderly manner. They are generally stable in nature and symmetrical about one or more axes.
- The sphere , cylinder m cone , cube and pyramid are examples of regular form.
- Forms can retain their regularity even when transformed dimensionally or by the addition or subtracted of elements.
- From our experiences with similar forms, we can construct a mental model of the original whole even when a fragment is missing or another par is added.

SPACE WITH IN A SPACE

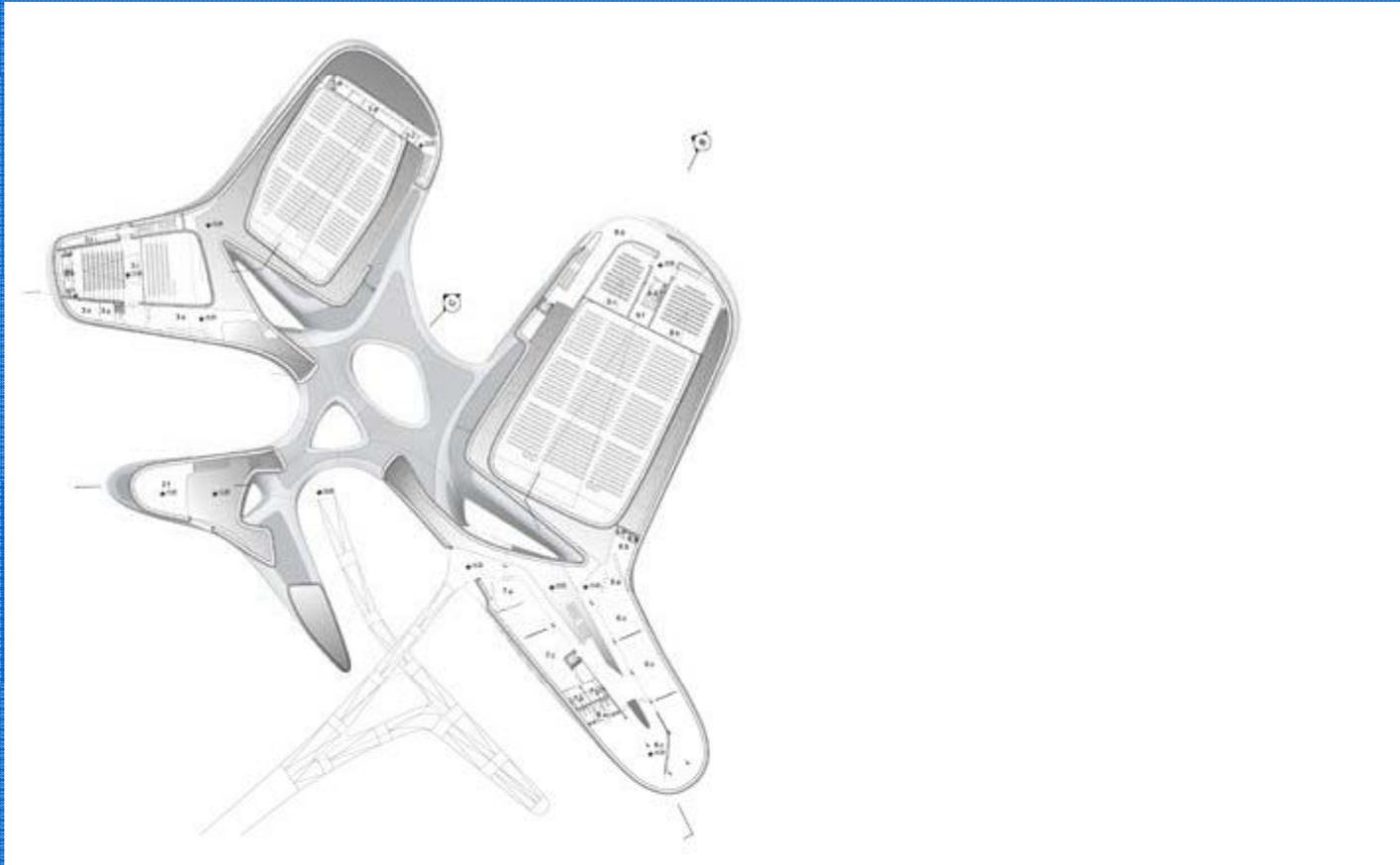


GLASS HOUSE , Connecticut , Philip Johnson

ADJACENT SPACE



SPACE LINKED BY COMMON SPACE



Regium Waterfront project by Zaha Hadid

UNIT -2

Principles of Design



1. Proportion
2. Balance
3. Scale
4. Axis
5. Rhythm
6. Hierarchy
7. Symmetry

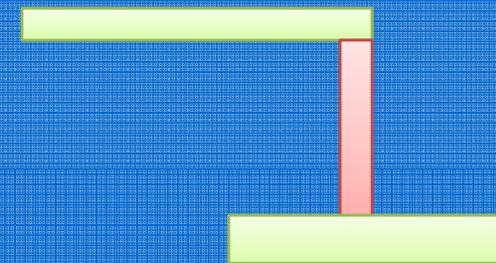
Proportion

1. The relationship between different things or parts with respect to comparative size, number, or degree
2. a part considered with respect to the whole
3. The interrelationship of all parts of an arrangement.

Structural Proportion

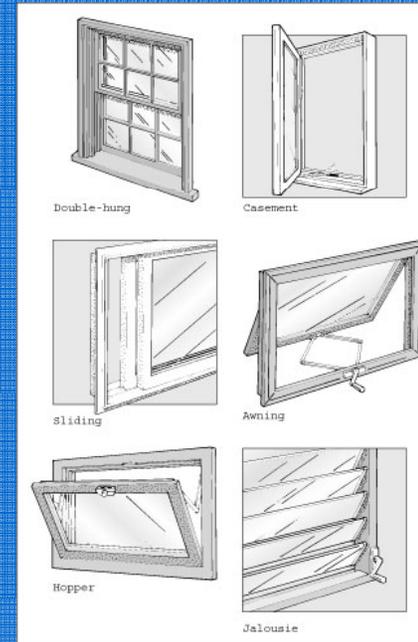


- ❑ Structural members are designed to transmit the load thru vertical supports in turn to the foundation.
- ❑ The column size depends on the span and the beam depth depend on the column size and the span.
- ❑ More the span , beam depth will increase .otherwise the structure will collapse.



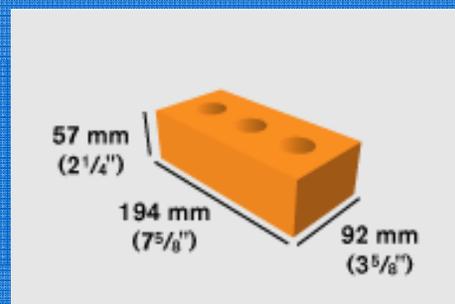
Manufactured Proportion

- Many architectural elements not only depend on structural proportion or function. It depends on the manufacturing process. As they are produced as a bulk product.



Casement window

Clay brick



Modular kitchen

Proportioning system



- More than technical aspect and space , these proportioning system plays a major role in creating a sense of order & pleasing appearance

THEORIES OF PROPORTION

1. GOLDEN SECTION
2. CLASSICAL ORDERS
3. KEN
4. MODULOR
5. ANTHROPOMETRY
6. SCALE
7. RENAISSANCE THEORIES

Golden section



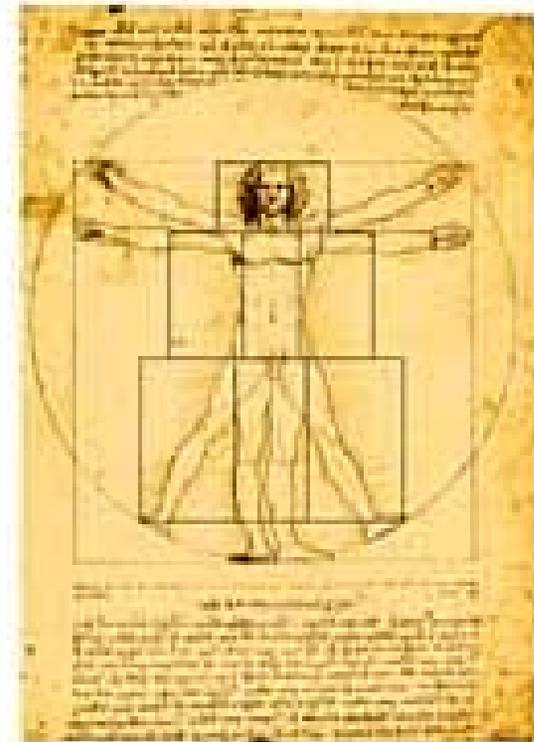
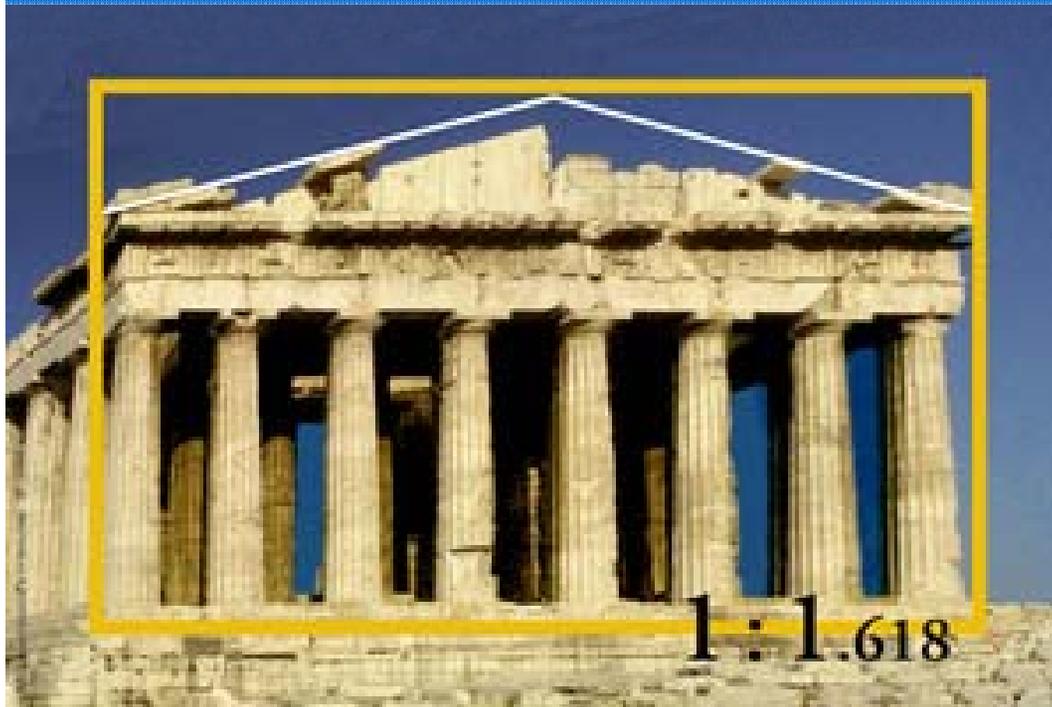
Rectangle one: Ratio 1:1

Rectangle two: Ratio 2:1

Rectangle Three: Ratio 1.618:1

The third rectangle is the most appealing. Because the ratio of its length to its width is the Golden Ratio! For centuries, designers of art and architecture have recognized the significance of the Golden Ratio in their work.

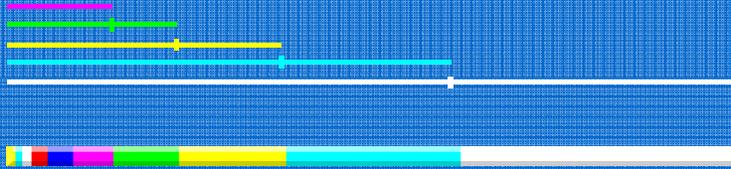
Proportioning system



Leonardo 1 : 1.618

The human body is based on Phi and 5

The human body illustrates the Golden Section. We'll use the same building blocks again:



The Proportions in the Body

The white line is the body's height.

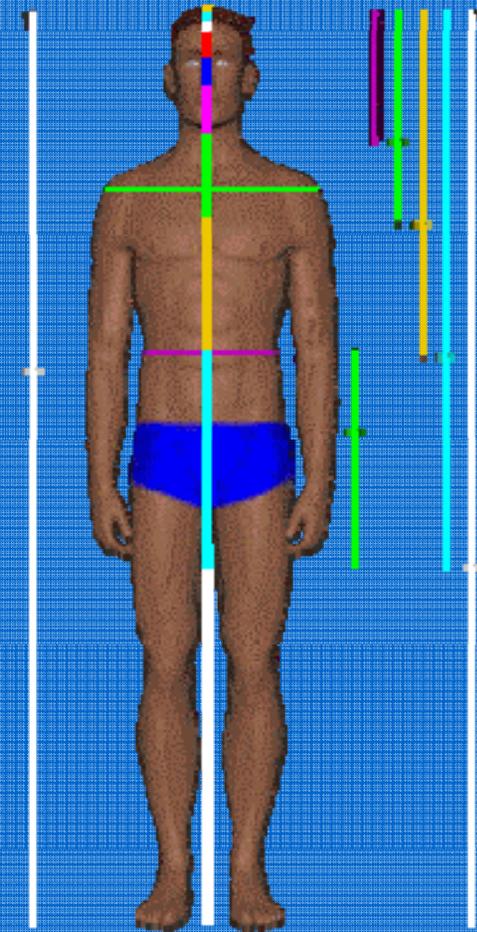
The **blue line**, a golden section of the white line, defines the distance from the head to the finger tips

The **yellow line**, a golden section of the **blue line**, defines the distance from the head to the navel and the elbows.

The **green line**, a golden section of the **yellow line**, defines the distance from the head to the pectorals and inside top of the arms, the width of the shoulders, the length of the forearm and the shin bone.

The **magenta line**, a golden section of the **green line**, defines the distance from the head to the base of the skull and the width of the abdomen. The sectioned portions of the magenta line determine the position of the nose and the hairline.

Although not shown, the golden section of the **magenta line** (also the short section of the green line) defines the width of the head and half the width of the chest and the hips.



The Fibonacci Numbers



and

The Golden Section



The Fibonacci Numbers

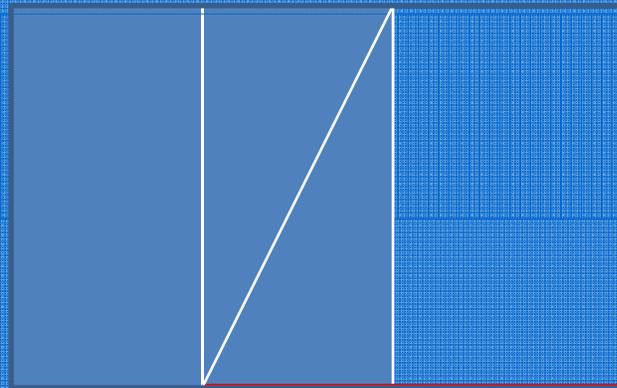
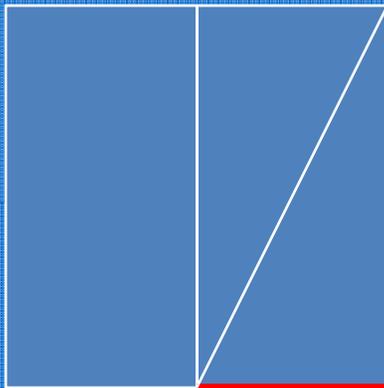
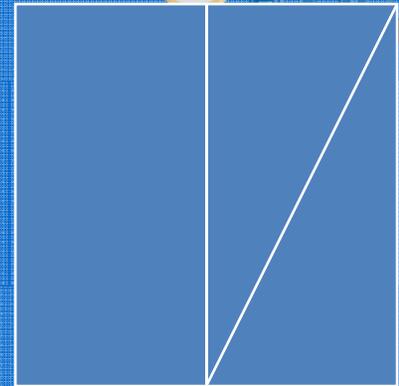
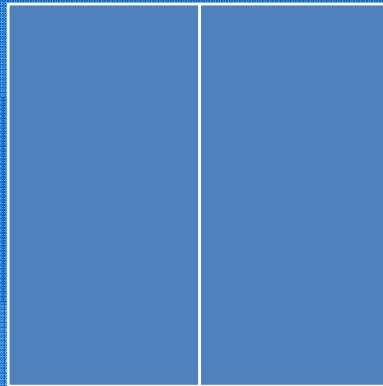
1. He introduced in *The Book of Calculating*
2. Series begins with 0 and 1
3. Next number is found by adding the last two numbers together
4. Number obtained is the next number in the series
5. Pattern is repeated over and over



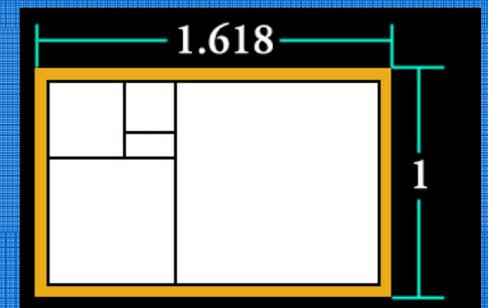
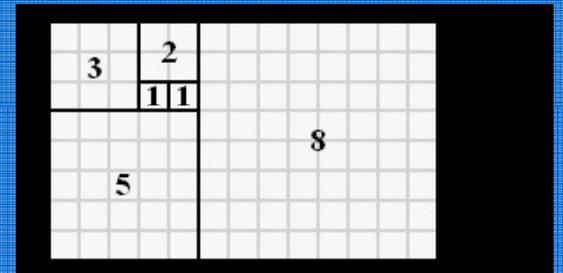
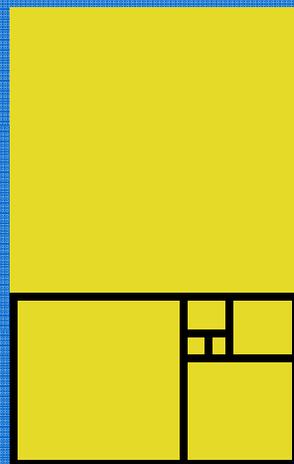
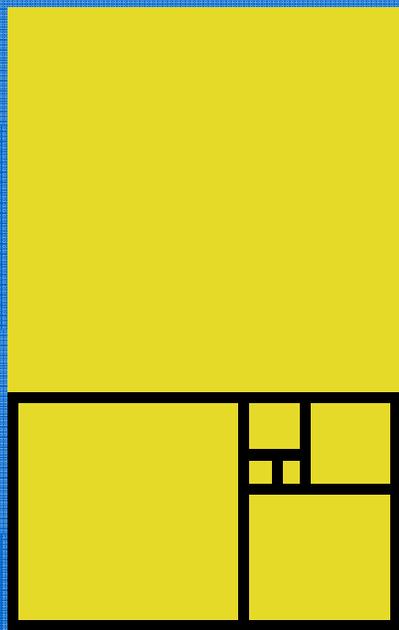
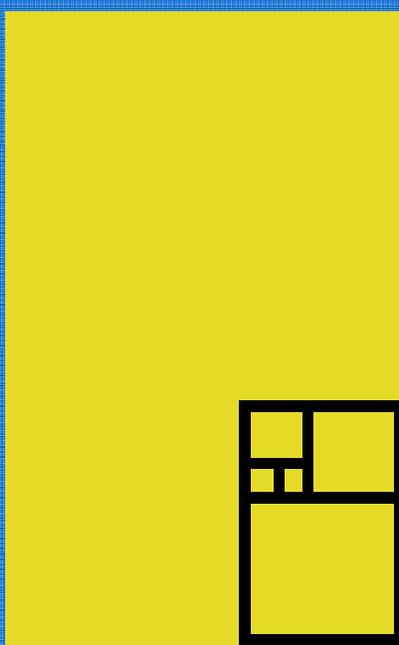
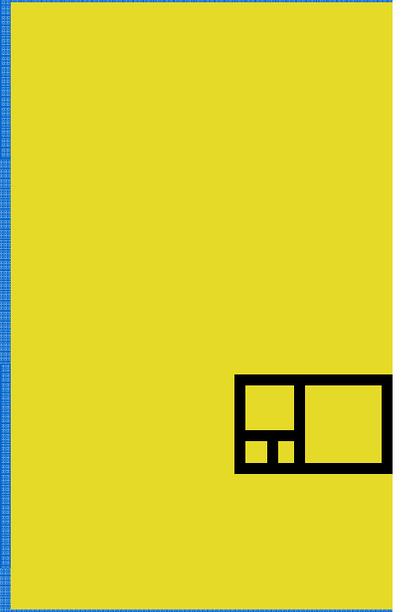
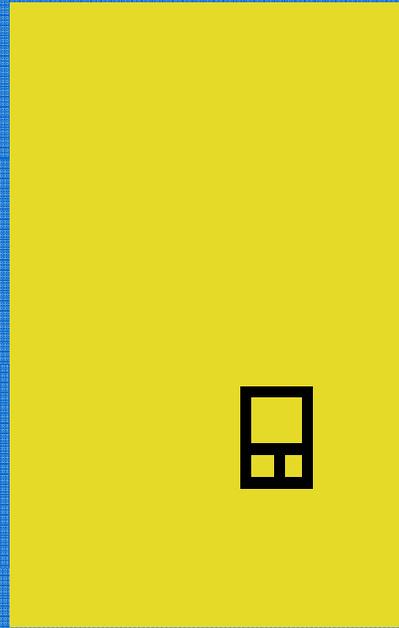
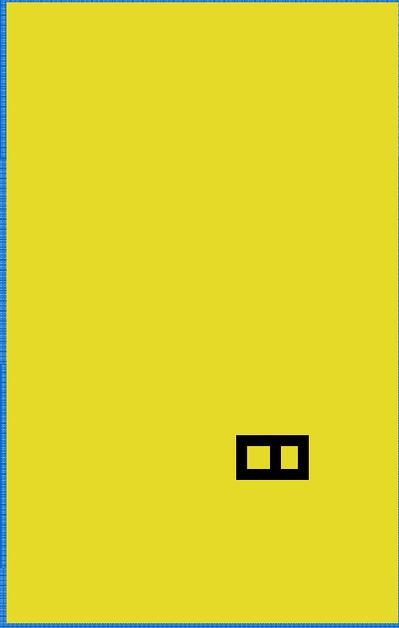
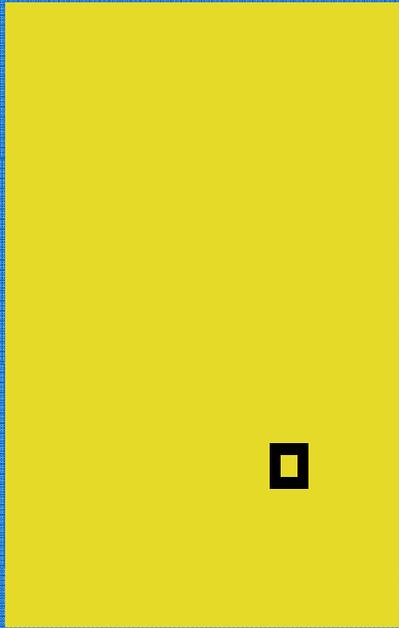
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, ...

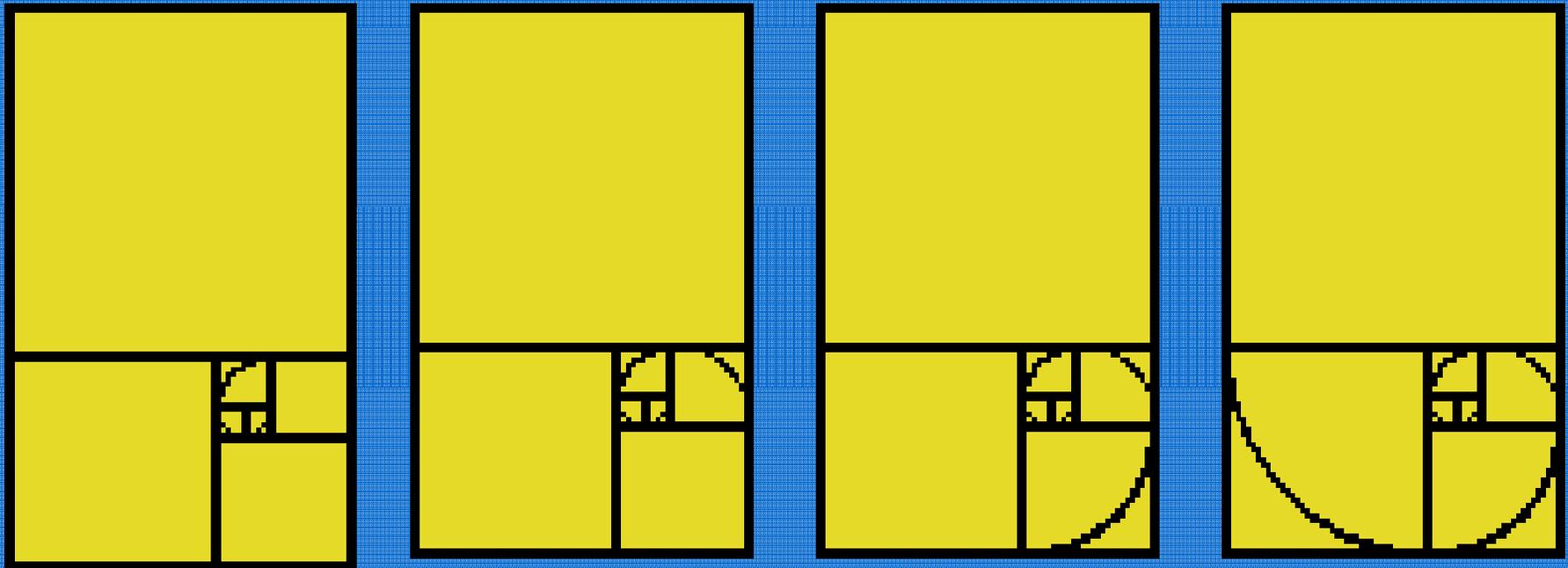
1	
1	
2	
3	1.5000000000000000
5	1.6666666666666670
8	1.6000000000000000
13	1.6250000000000000
21	1.6153846153846200
34	1.6190476190476200
55	1.6176470588235300
89	1.6181818181818200
144	1.6179775280898900
233	1.6180555555555600
377	1.6180257510729600
610	1.6180371352785100
987	1.6180327868852500
1,597	1.6180344478216800
2,584	1.6180338134001300
4,181	1.6180340557275500
6,765	1.6180339631667100
10,946	1.6180339985218000
17,711	1.6180339850173600
28,657	1.6180339901756000
46,368	1.6180339882053200
75,025	1.6180339889579000

The ratio in golden ratio



Drawing golden rectangle



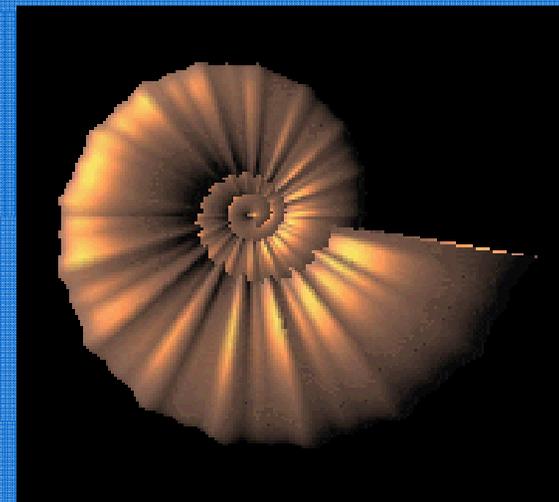
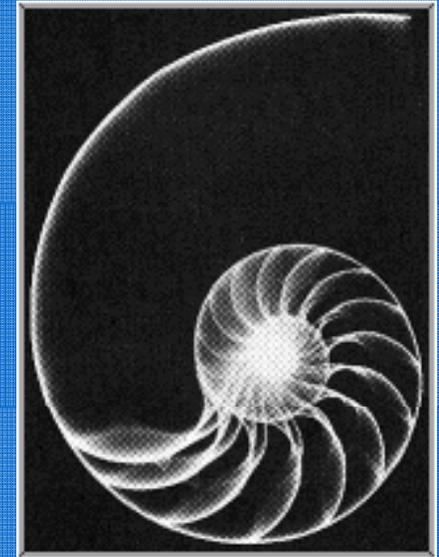
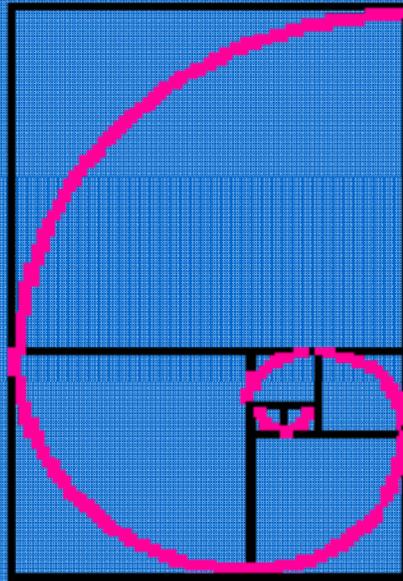
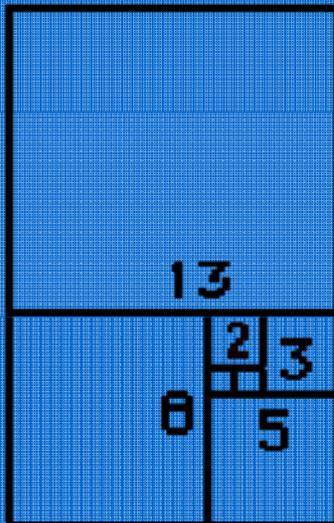


Golden Spiral manipulative

The Fibonacci Numbers in Nature

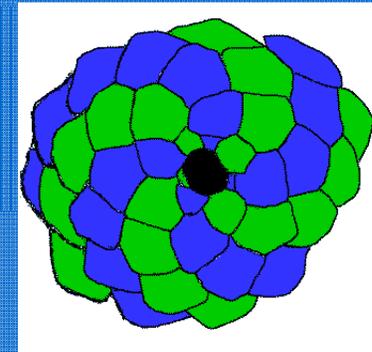
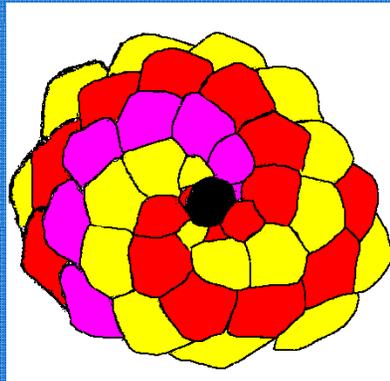
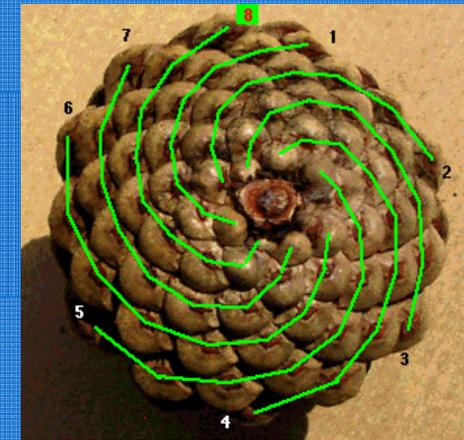
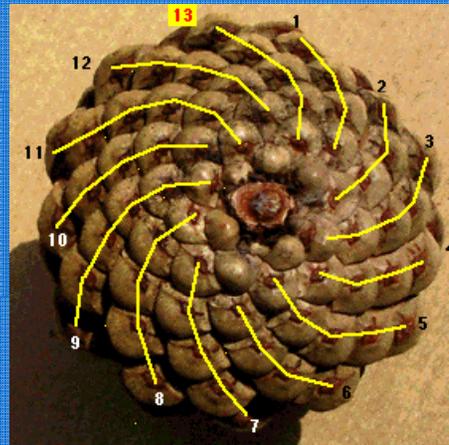


~ Fibonacci spiral found in both snail and sea shells



The Fibonacci Numbers in Nature Continued

~ Pinecones clearly show the Fibonacci spiral



The Fibonacci Numbers in Nature Continued



Lilies and irises = 3 petals

Buttercups and wild roses = 5 petals



Corn marigolds = 13 petals

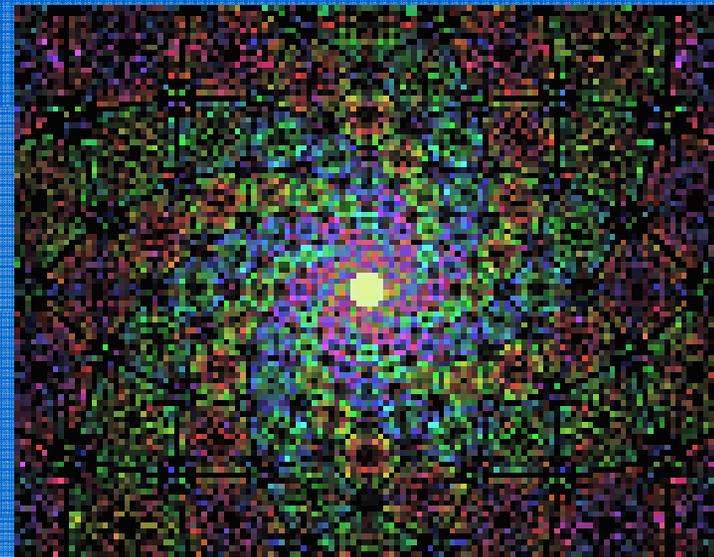
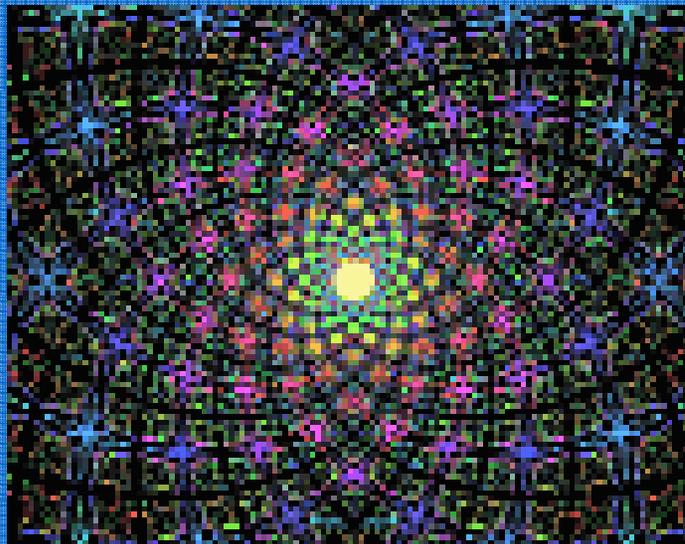


Black-eyed Susan's = 21 petals

The Fibonacci Numbers in Nature Continued



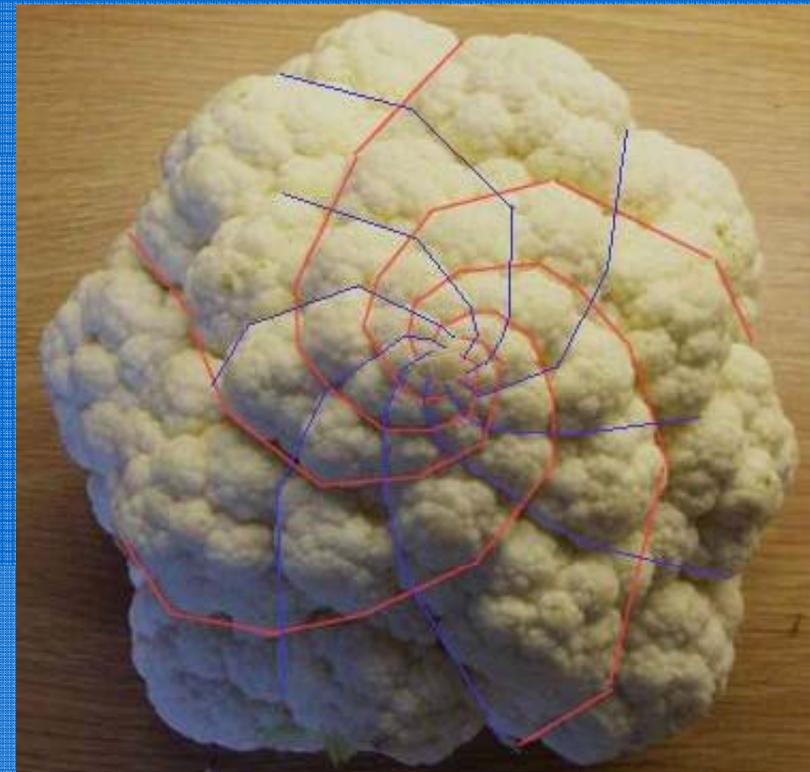
- ~ Fibonacci spirals can be made through the use of visual computer programs
- ~ Each sequence of layers is a certain linear combination of previous ones



The Fibonacci Numbers in Nature Continued



~ Fibonacci spiral can be found in cauliflower



The Fibonacci Numbers in Nature Continued

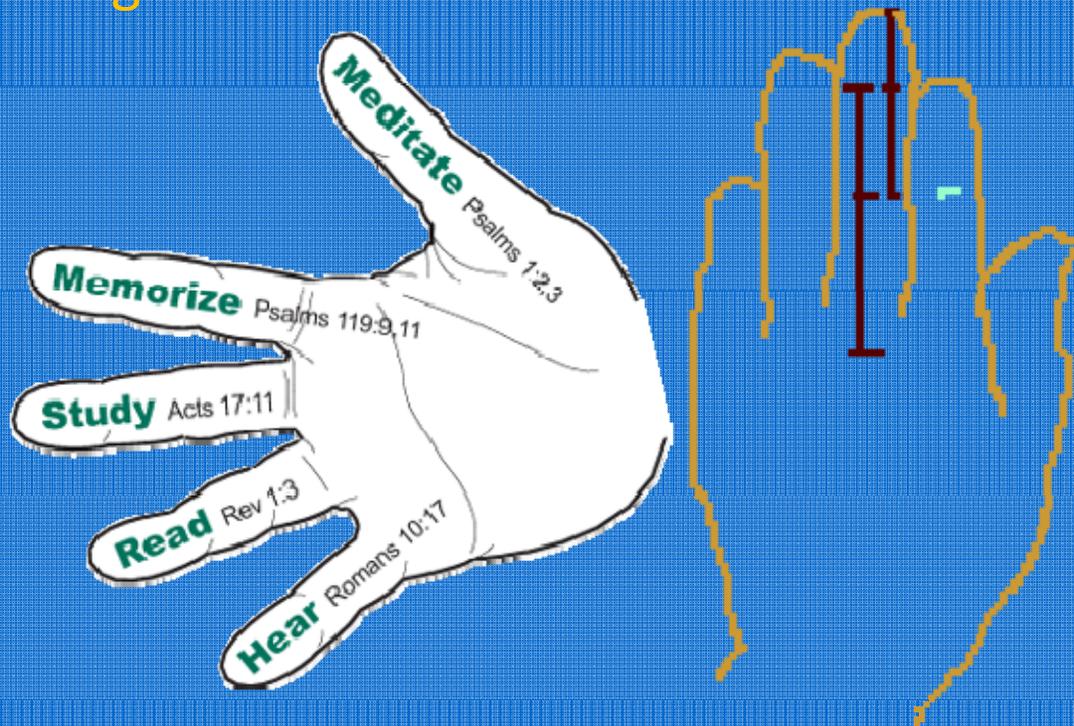


- ~ The Fibonacci numbers can be found in pineapples and bananas
- ~ Bananas have 3 or 5 flat sides
- ~ Pineapple scales have Fibonacci spirals in sets of 8, 13, 21



The Fibonacci Numbers in Nature Continued

~ The Fibonacci numbers can be found in the human hand and fingers
- 5 fingers

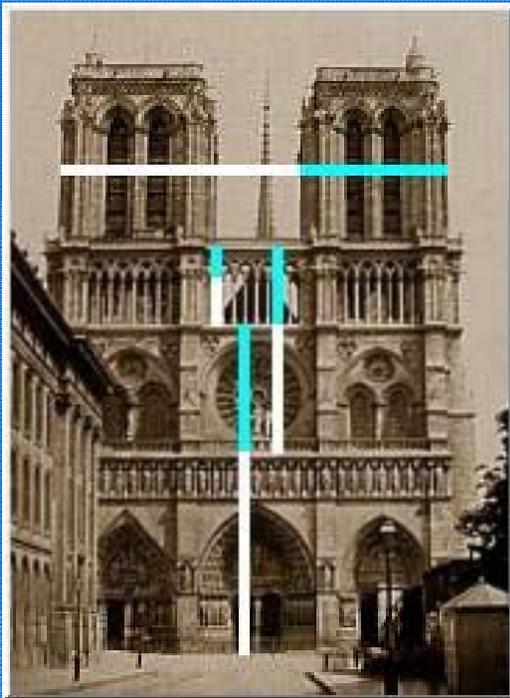


The ratio of your forearm to hand is Phi

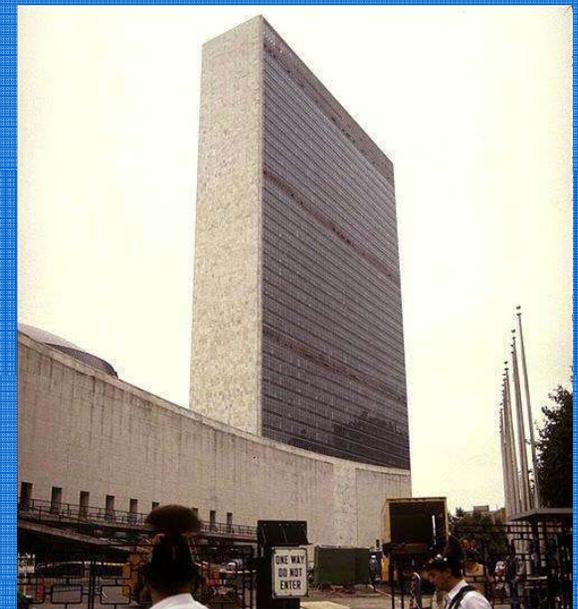


The Golden Section in Architecture Continued

- ~ Golden section can be found in the design of Notre Dame in Paris
- ~ Golden section continues to be used today in modern architecture



United Nations Headquarters



Secretariat building

Modular

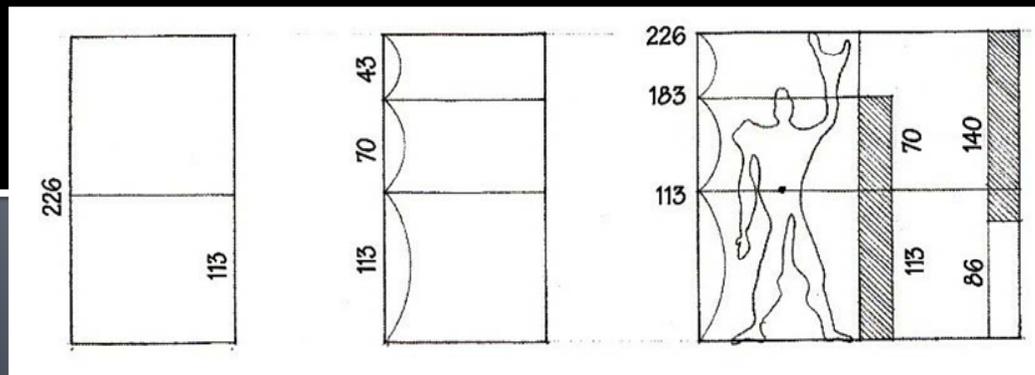
Le Corbusier began his study in 1942, and published the Modular: a harmonious measure to the human scale universally applicable to architecture and mechanics.

The basic grid consists of three measures, 113, 70, and 43 centimeters, proportioned according to the golden section, where : $a / b = b / (a + b)$

$$43 + 70 = 113$$

$$70 + 113 = 183$$

$$113 + 70 + 43 = 226 (2 \times 113)$$

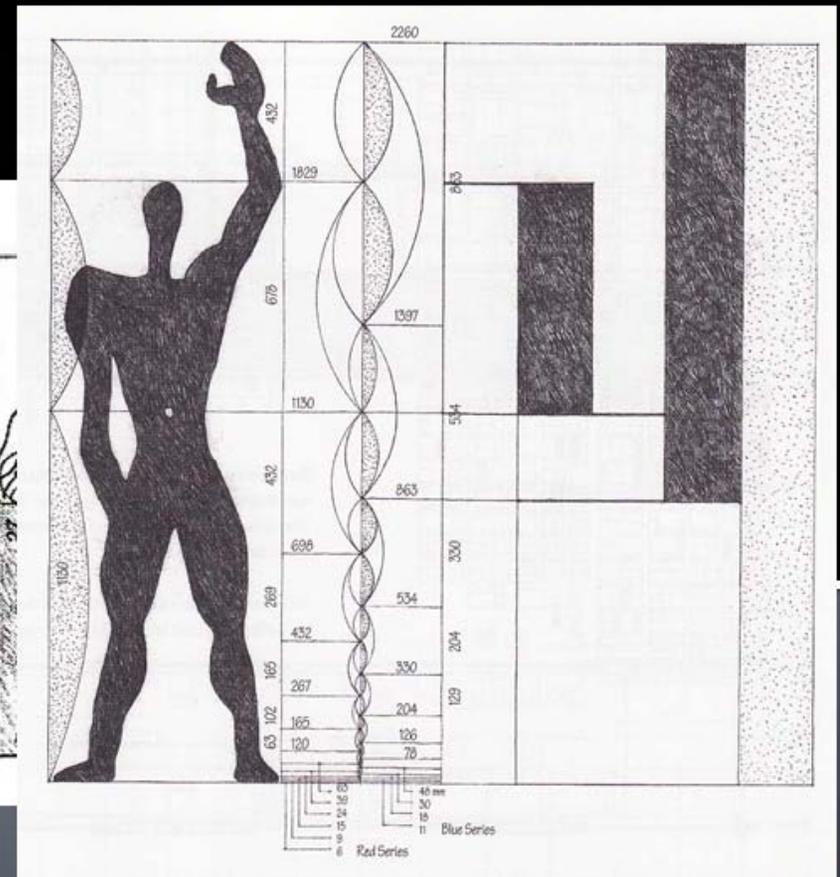
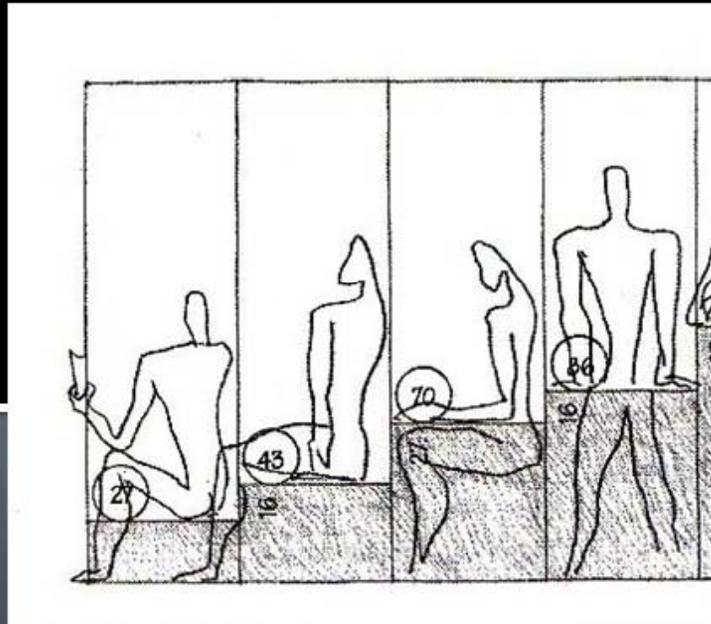


Modular

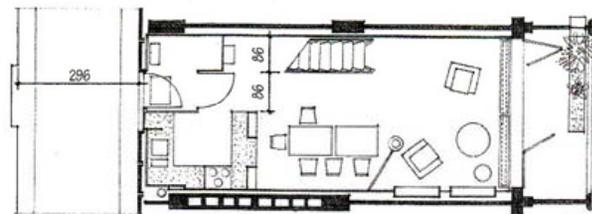
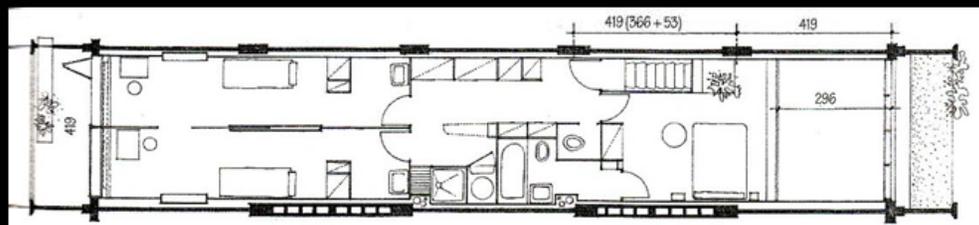
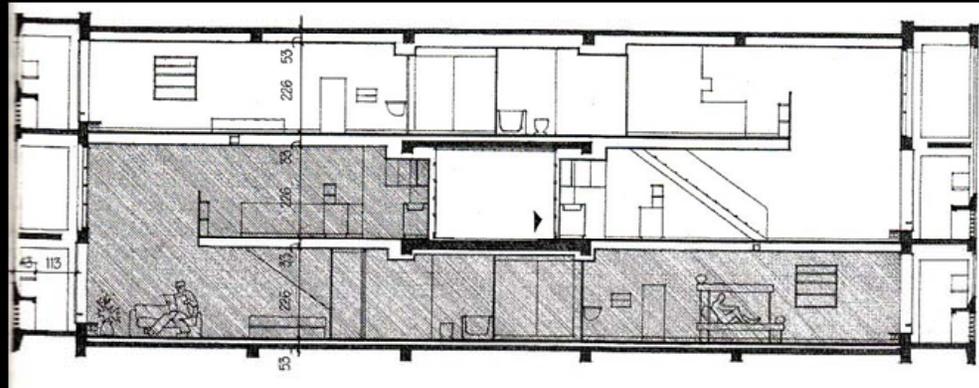


113, 183, and 226 define the space occupied by the human figure.

From 113 and 226, Le Corbusier developed the red and blue series, the scale and dimensions that were related to the size of the human figure.



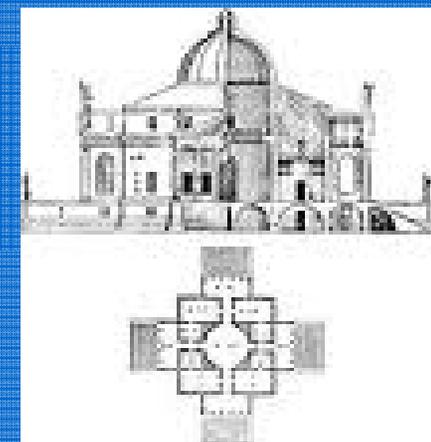
Modular



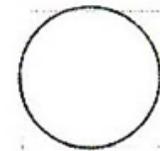
Plans and Section of Typical Apartment Unit,
Unité d'Habitation, Marseilles, 1946-52, Le Corbusier

RENAISSANCE THEORIES

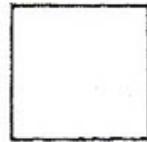
- ❑ The architecture of Andrea Palladio has influenced countless generations of architects, beginning most notably with Inigo Jones in England .
- ❑ Expounding on the theories of Pythagoras, Plato claimed that the harmony of the world was contained in seven numbers, {1,2,3,4,8,9,27}, which were derived from musical consonances and could be broken down into two sets, {1,2,4,8} and {1,3,9,27}
- ❑ These numbers and their ratios became the basis for the proportions used by Palladio.
- ❑ In all the villa capra , villa rotunda Palladio used these proportion in room size or in building dimension which is more harmonious as musical note.
- ❑ The overall ratios of the lengths and widths of the rooms,
- ❑ 16:24:36, then becomes 4:6:9, with 6 as the geometric mean between 4 and 9 and further connecting the rooms .



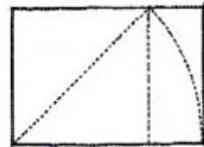
Ideal shape for room



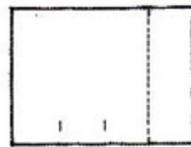
Circle



Square



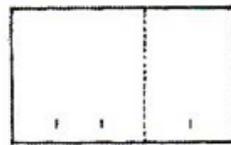
$1:\sqrt{2}$



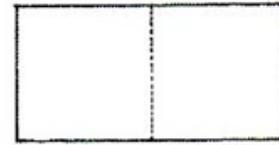
3:4



2:3



3:5



1:2

CLASSICAL ORDER PROPORTION



- Greek and Roman columns represent the perfect proportion to express beauty and harmony.
- The basic unit of dimension was the diameter of the column. The other parts' dimensions are derived from this.

ANTHROPOMETRY

The measurement of the human individual for the purposes of understanding human physical variation.

Anthropometry plays an important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products.

Changes in life styles, nutrition and ethnic composition of populations lead to changes in the distribution of body dimensions and require regular updating of anthropometric data collections.

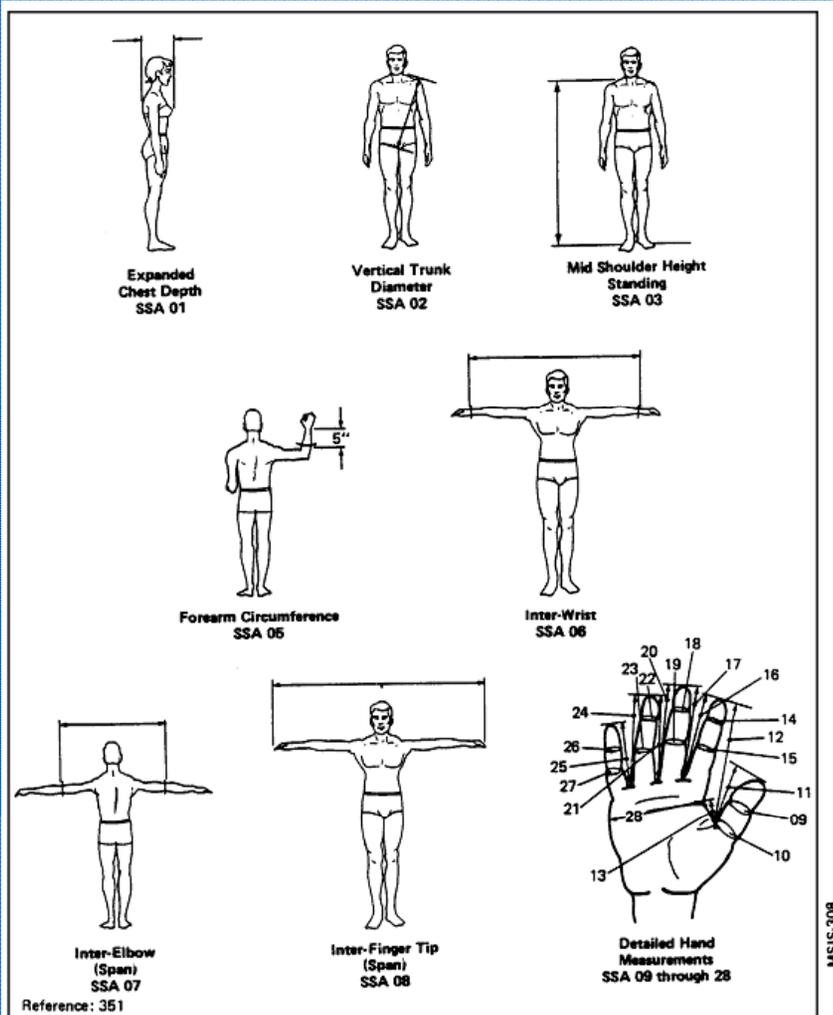


Figure 14.3.4.1-3. Space Suit Non-Standard Anthropometrics

Ken

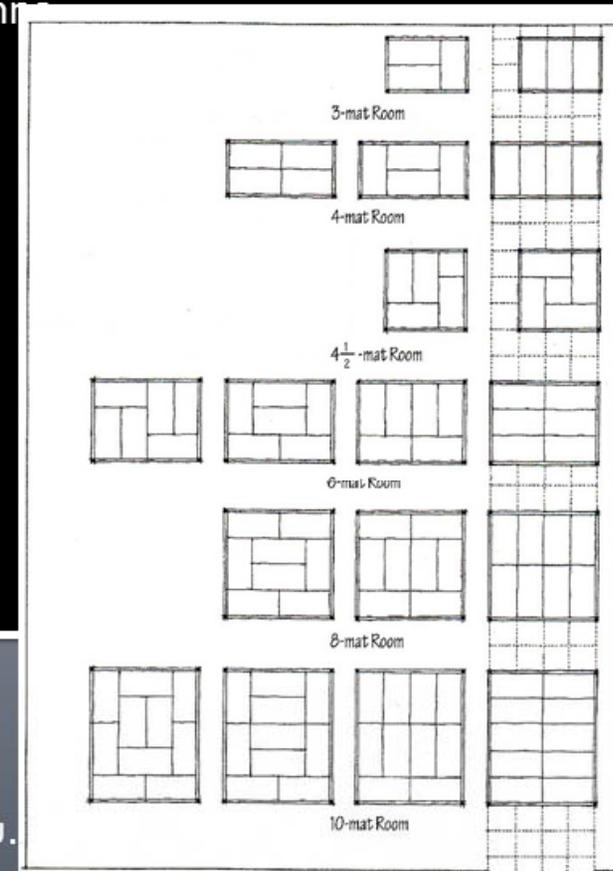
- Japanese unit of measurement is shaku and ken , like feet and inches.

Ken

Two methods of designing with the ken modular grid developed that affected its dimension. In the inaka-ma method, the ken grid of 6 shaku determined the center-to-center spacing of columns. Therefore, the standard tatami floor mat (3x6 shaku or 1/2x1ken) varied slightly to allow for the thickness of the columns.

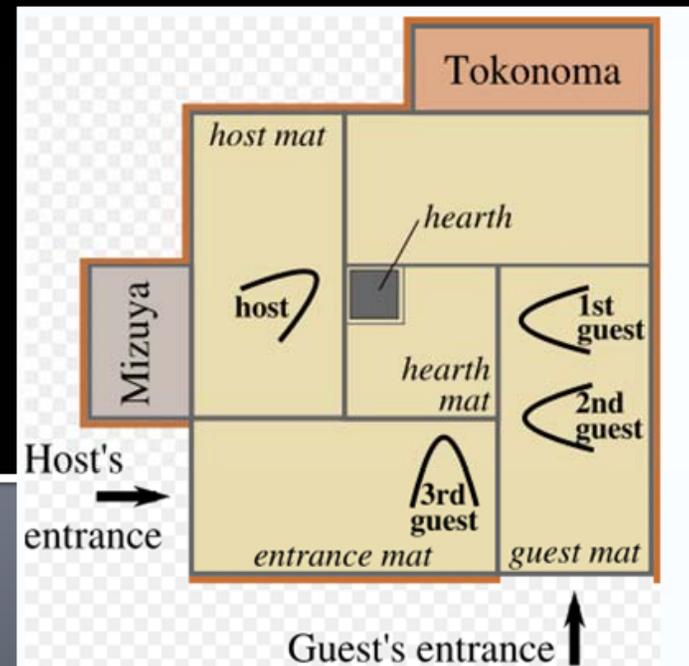
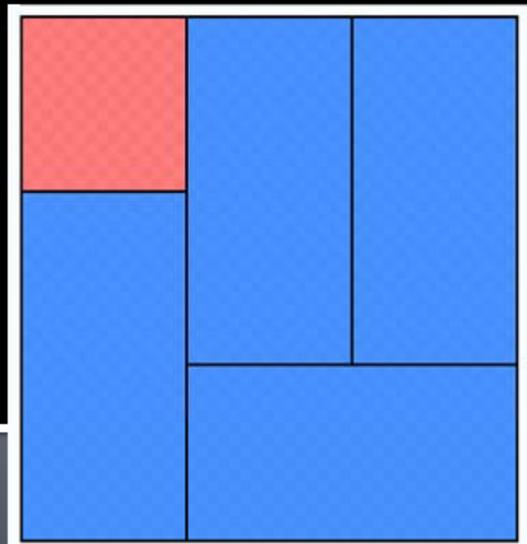
Shakkan-ho			Metric system	Imperial system	
ken	shaku	sun	m	yd.	ft.
1	6	60	1.8	1.8	6

In the kyo-ma method, the floor mat remained constant (3.15x6.30 shaku) and the column spacing (ken module) varied according to the size of the room and ranged from 6.4 to 6.7 shaku.



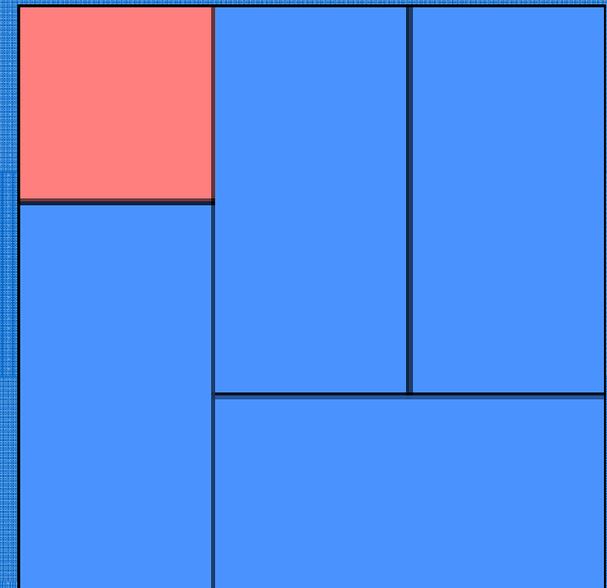
Ken

The ken, however, was not only a measurement for the construction of buildings. It evolved into an aesthetic module that ordered the structure, materials, and space of Japanese architecture.



- Size of the floor mat depends on the proportion of two persons sitting or one person sleeping.

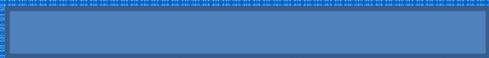
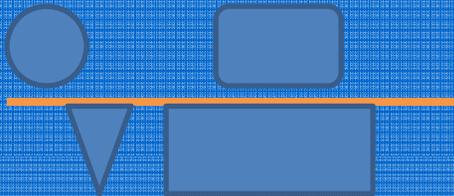
Eg 6 mats = 9 ft x 12 ft



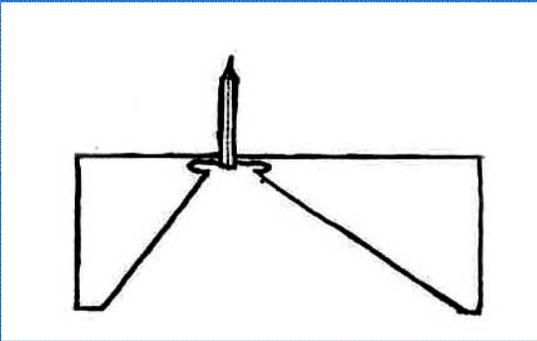
Axis



- Is the imaginary line that organizes forms and organization in architecture.
- It is line established by two points in space about which forms and space can be arranged in a regular or irregular manner.
- It is powerful , dominating regulating devices.
- It implies symmetry and demands balance.



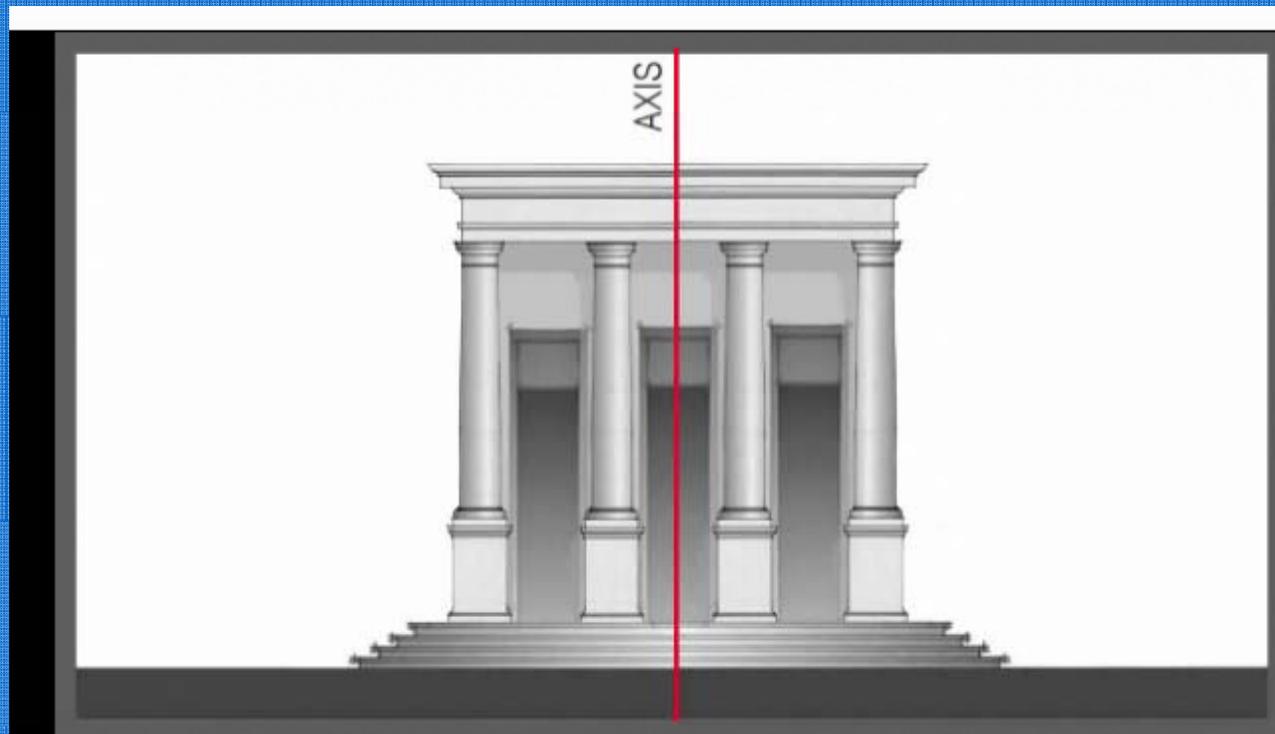
1. Axis is a linear condition it has length , direction.it induces movement and promotes view along its path.
2. Can be terminated at both ends by means of forms or space.
3. It can be reinforced by defining edges along its length.



- Points in space established by vertical, linear elements or centralized building forms.
- Vertical planes such as symmetrical building façade or fronts, preceded by courts or similar open spaces.
- Well defined spaces, generally centralized or regular in form.
- Gateways that open outward to a view and beyond.

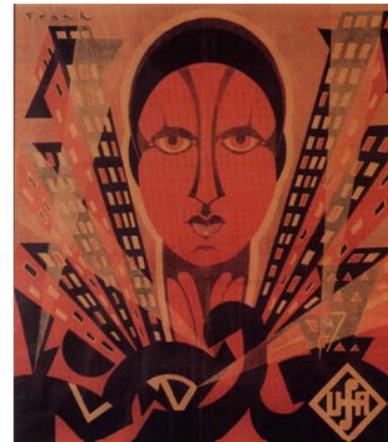


Gateway Arch,
Memorial in
St. Louis,
Missouri



SYMMETRY

We can find symmetry in nature, architecture and in art



1. Symmetry is the balanced distribution and arrangement of equivalent forms and spaces on opposite sides of a dividing line or plane or about a center or axis.
2. Symmetry is the one of modes of orderliness.
3. Symmetry arouses visual stability.
4. A symmetrical object is better organized and retained in memory.
5. An axis can exist with out symmetry but symmetrical condition can not exist without axis and center about which it is structured.

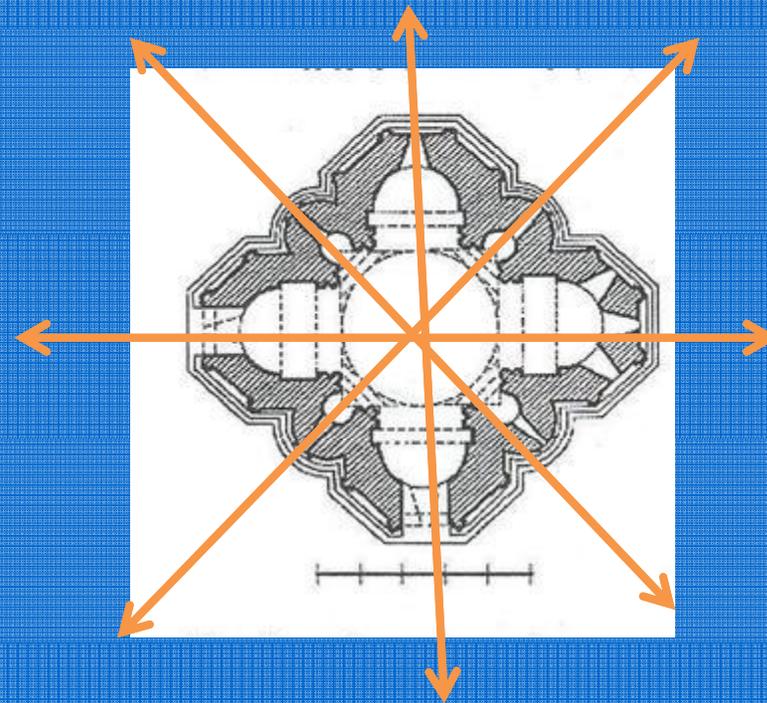
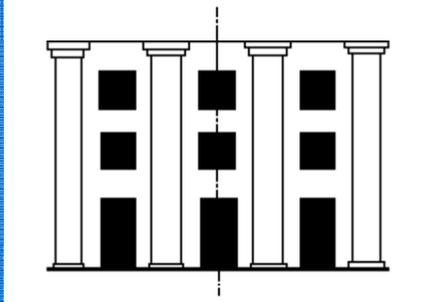
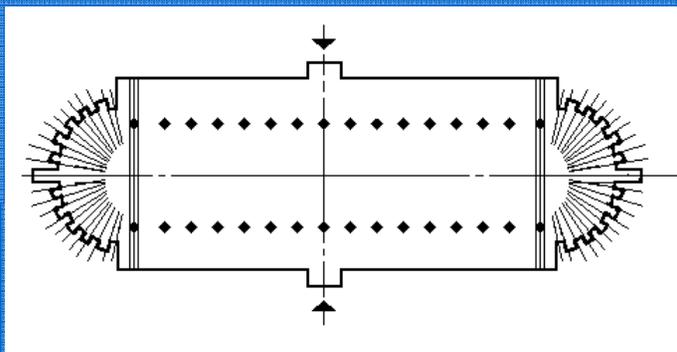
Two types

Bilateral symmetry

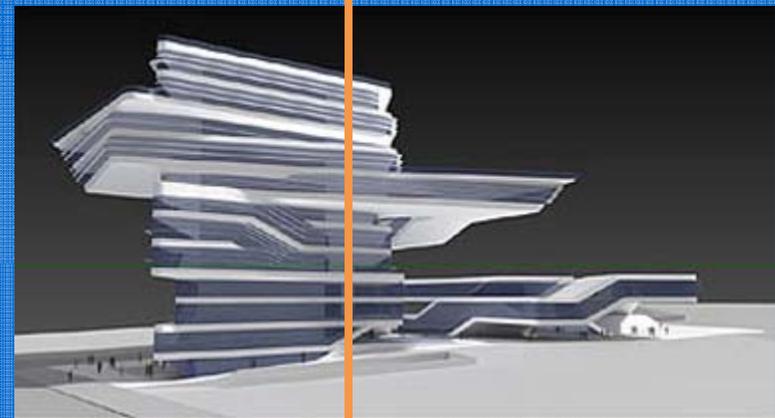
In bilateral symmetry, the halves of a composition mirror each other.

Radial symmetry

Refers to the balanced arrangement of similar radiating elements such that the composition can be divided into similar halves by passing a plane at any angle around a center point along a center axis.



1. A compositions can be symmetrical.
2. A symmetrical condition can occur in only a portion of the building and organize an irregular pattern of forms and space about itself.



Zaha Hadid's Edifici Campus, Barcelona

Symmetrical



Santiago Calatrava
Lyon-Satolas TGV Station
Lyon, France

Asymmetrical



Roman Catholic Cathedral

Symmetry evokes stability & balance evokes dynamism

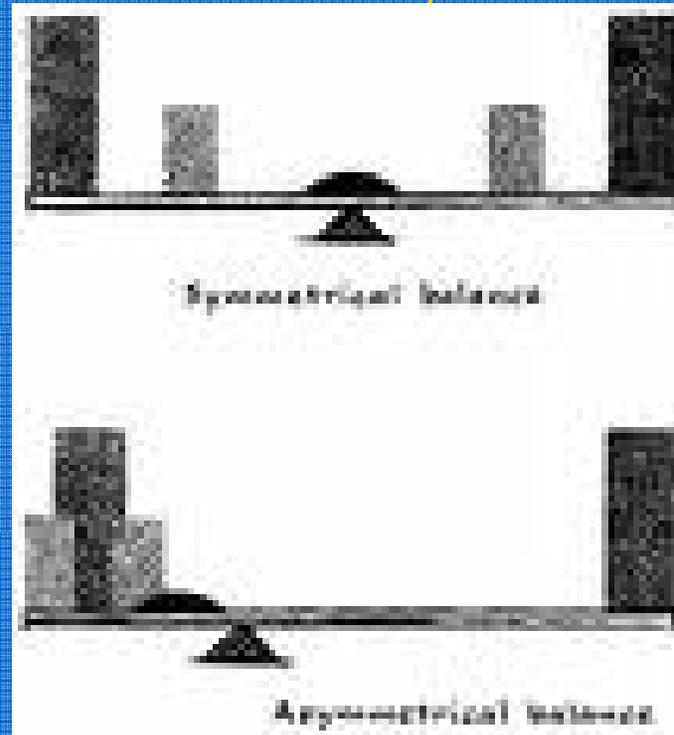
Balance

- **Stability of an arrangement**
 - Arrangement appears secure and stable
 - Balance must be both visual and actual
 - visual balance refers to the way an arrangement appears to the eye.

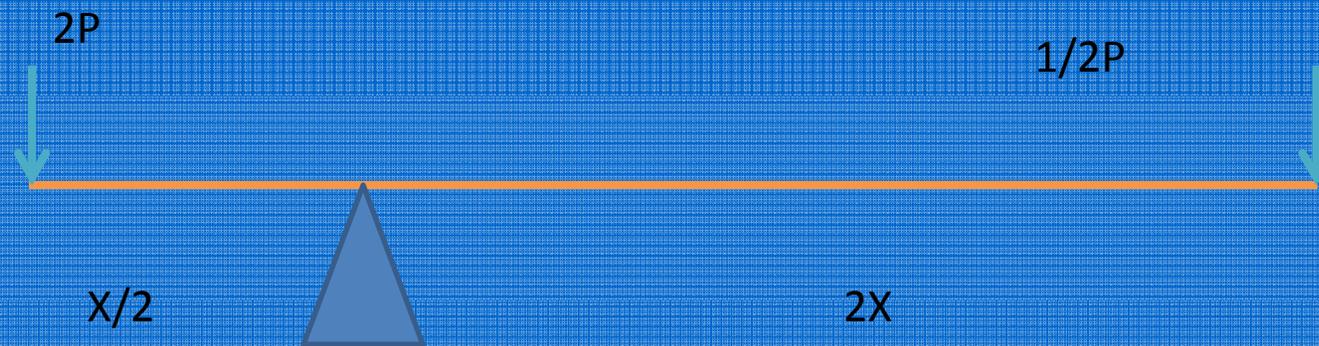
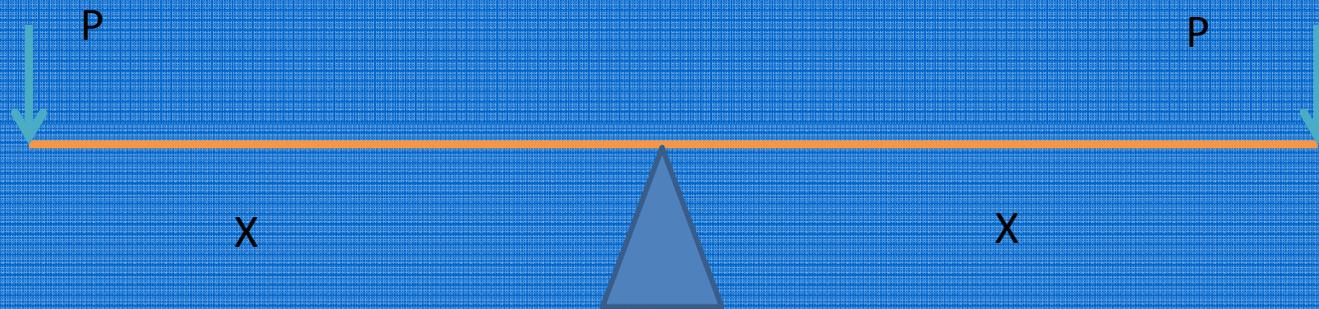


Balance

- Symmetrical and Asymmetrical balance are two types commonly used.



SYMMETRIC EQUILIBRIUM



BALANCED EQUILIBRIUM

UNIT - 3

UNIT-3_CIRCULATION-PART-1



Circulation- Movement through Space.

Approach- The Distant View

Entrance- From Outside to Inside

Configuration of Space- The Sequences of Space

Path-Space Relationships- Edges, Nodes, & Terminations of the path

Form of the Circulation Space- Corridors, Halls, Galleries, Stairways & Rooms.

Approach- The Distant View

- ❑ First phase of Circulation system, during which we are prepared to see, Experience & use the spaces within.
- ❑ Make your path more legible in visual ways.
- ❑ May vary in duration- compressed space to lengthy & circuitous routes.
- ❑ Nature of approach contrasts in its termination to an interior.
- ❑ Portals & Gateways - Orient us to path & welcomes Entry

Types of Approach



1. Frontal

- Axial Path
- Approach is clear.
- Entire front facade or entrance within it is made clear.

2. Oblique

- Path re-directed 1 or more times.
- Approached at an extreme angle.
- Enhances effect of perspective.

3. Spiral

- Curved path
- Entrance may or may not be visible until the point of arrival.
- Emphasizes the 3D form as the bldg is approached.

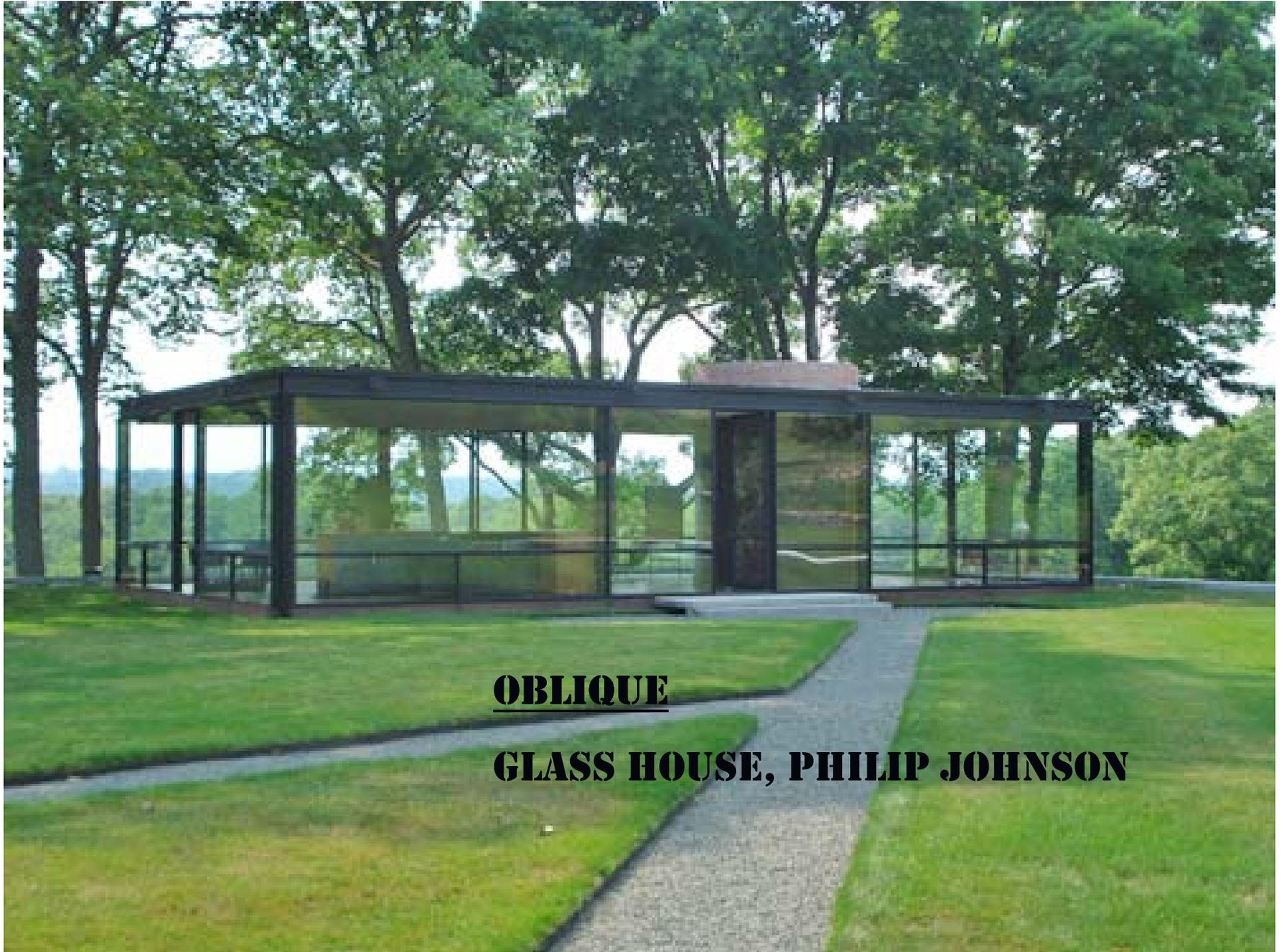
Frontal:

Villa Barbaro, Andrea Palladio



Qian men, China.

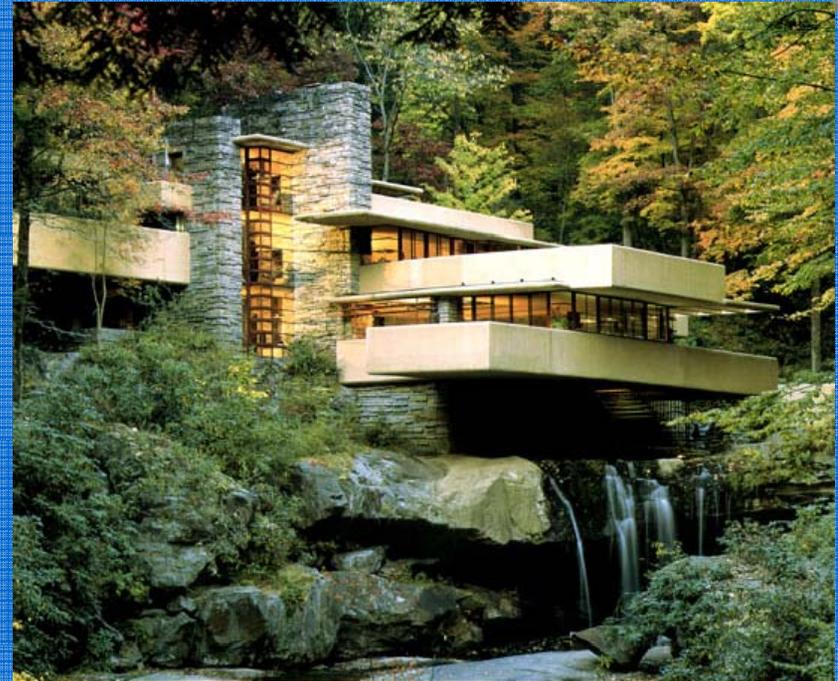
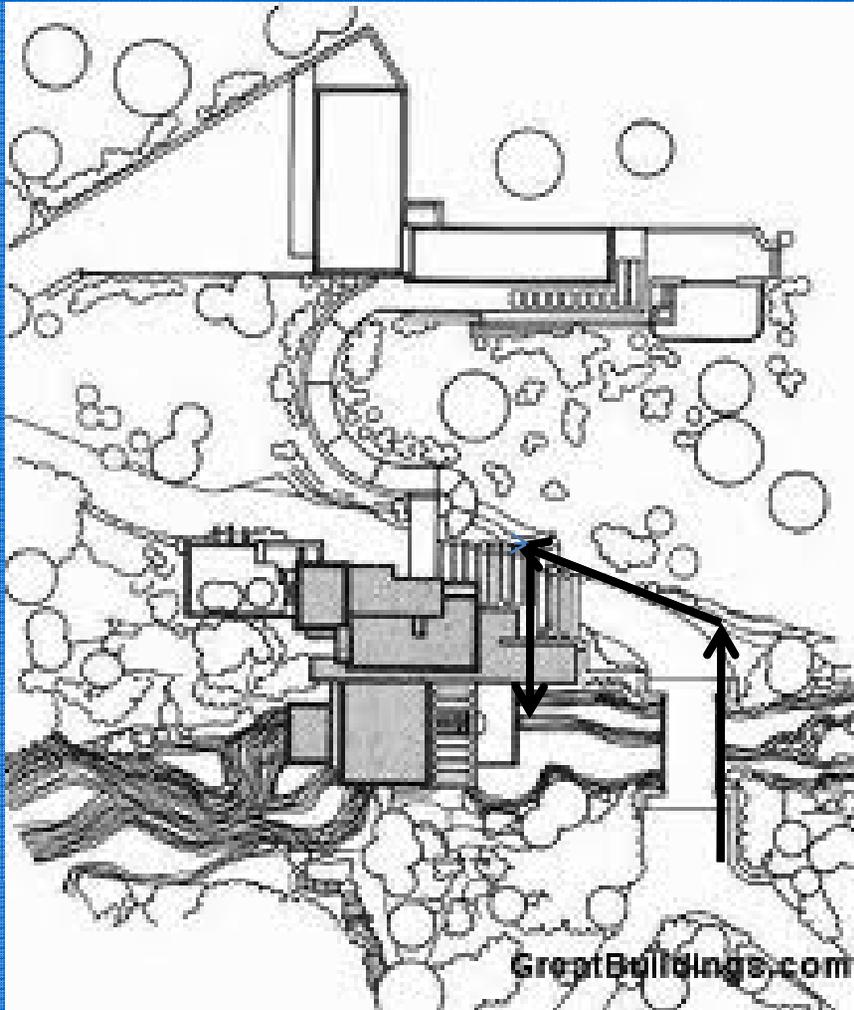




OBLIQUE

GLASS HOUSE, PHILIP JOHNSON

SPIRAL: FALLING WATER ,PENNYSYLVANIA BY FL.WRIGHT



Entrance- Exterior to Interior

1. Flush

- Maintains continuity along with the wall.

2. Projected

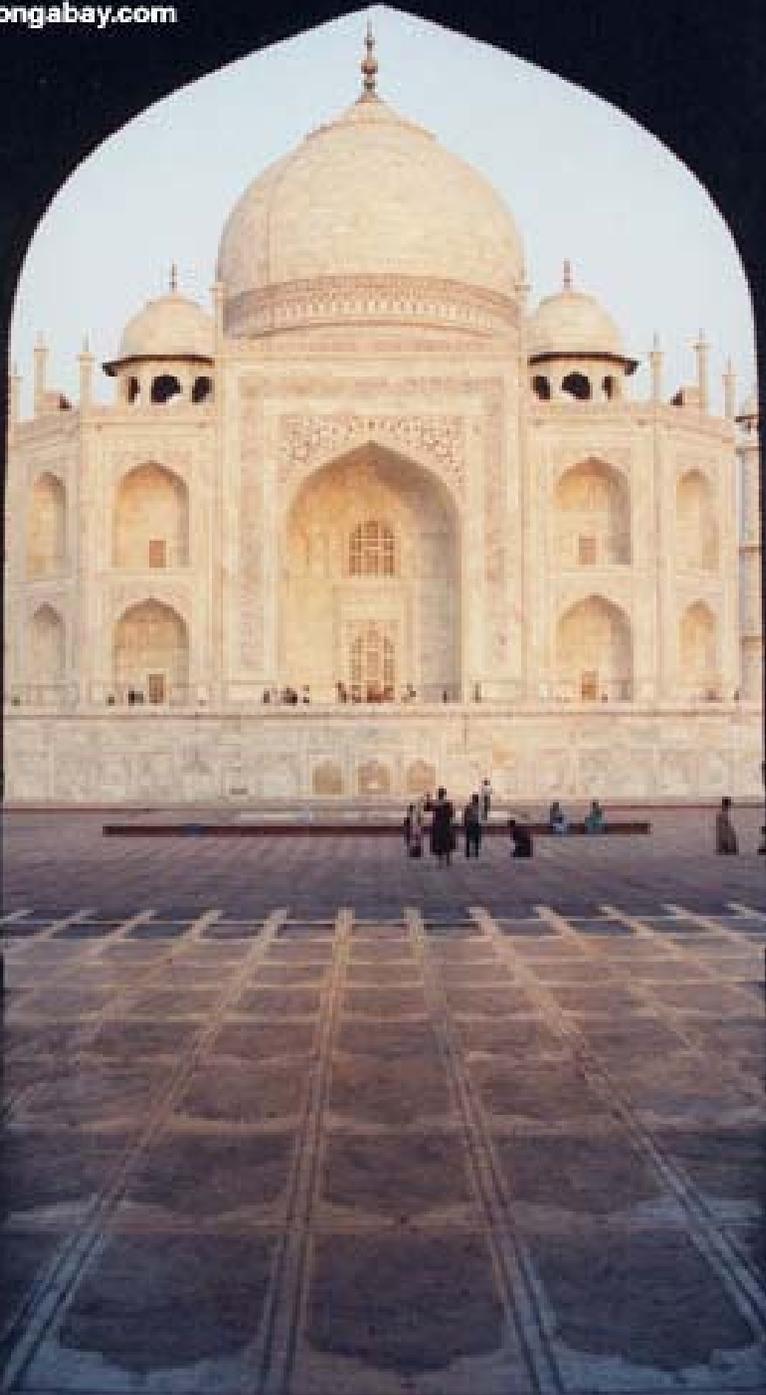
- Transitional space, announces function, provides head-shelter.

3. Recessed

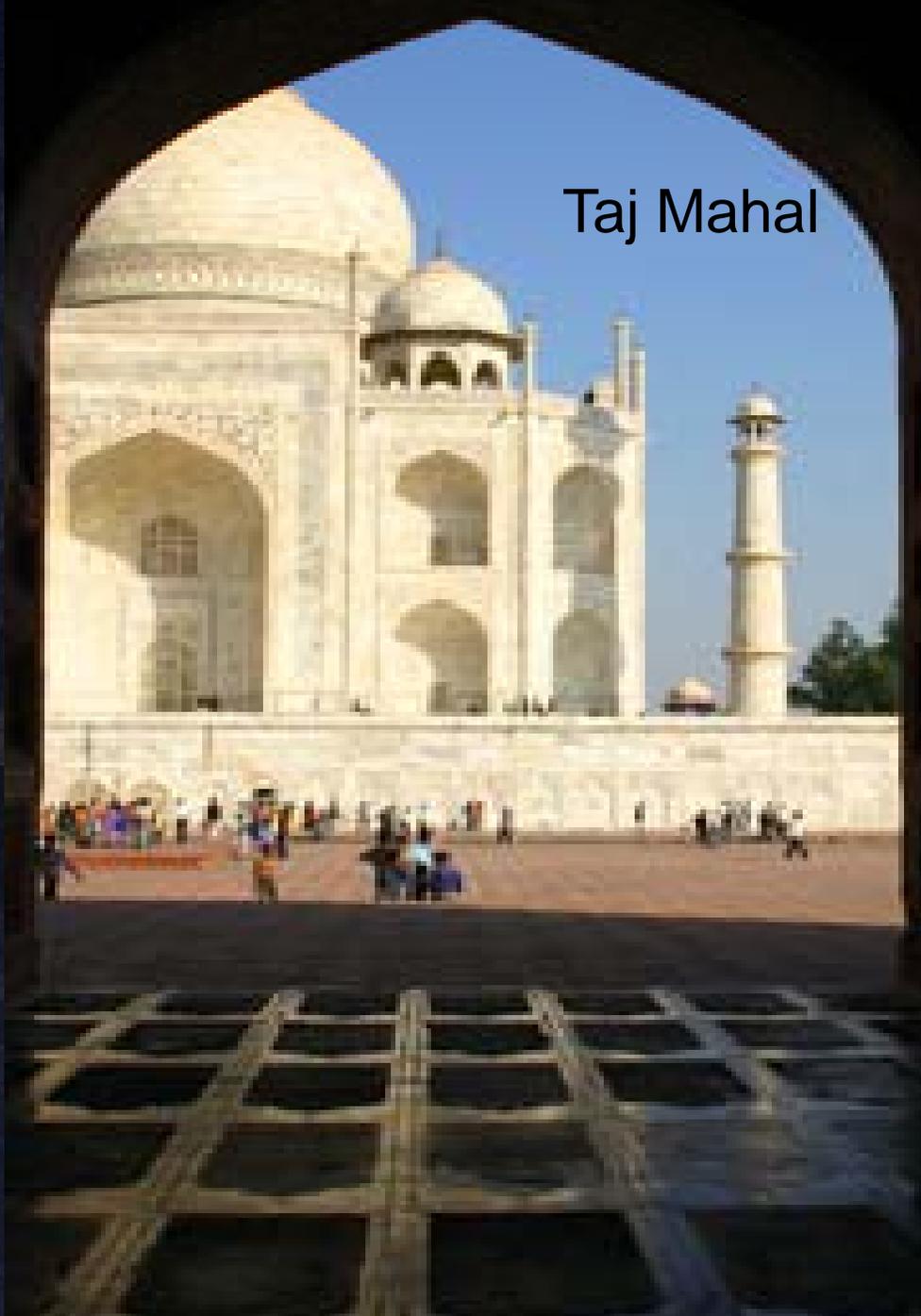
- Also provides shelter but uses a portion of interior space.



mongabay.com



Taj Mahal





Flushed entrance

Flushed entrance - John F
Kennedy memorial , Philip
Johnson

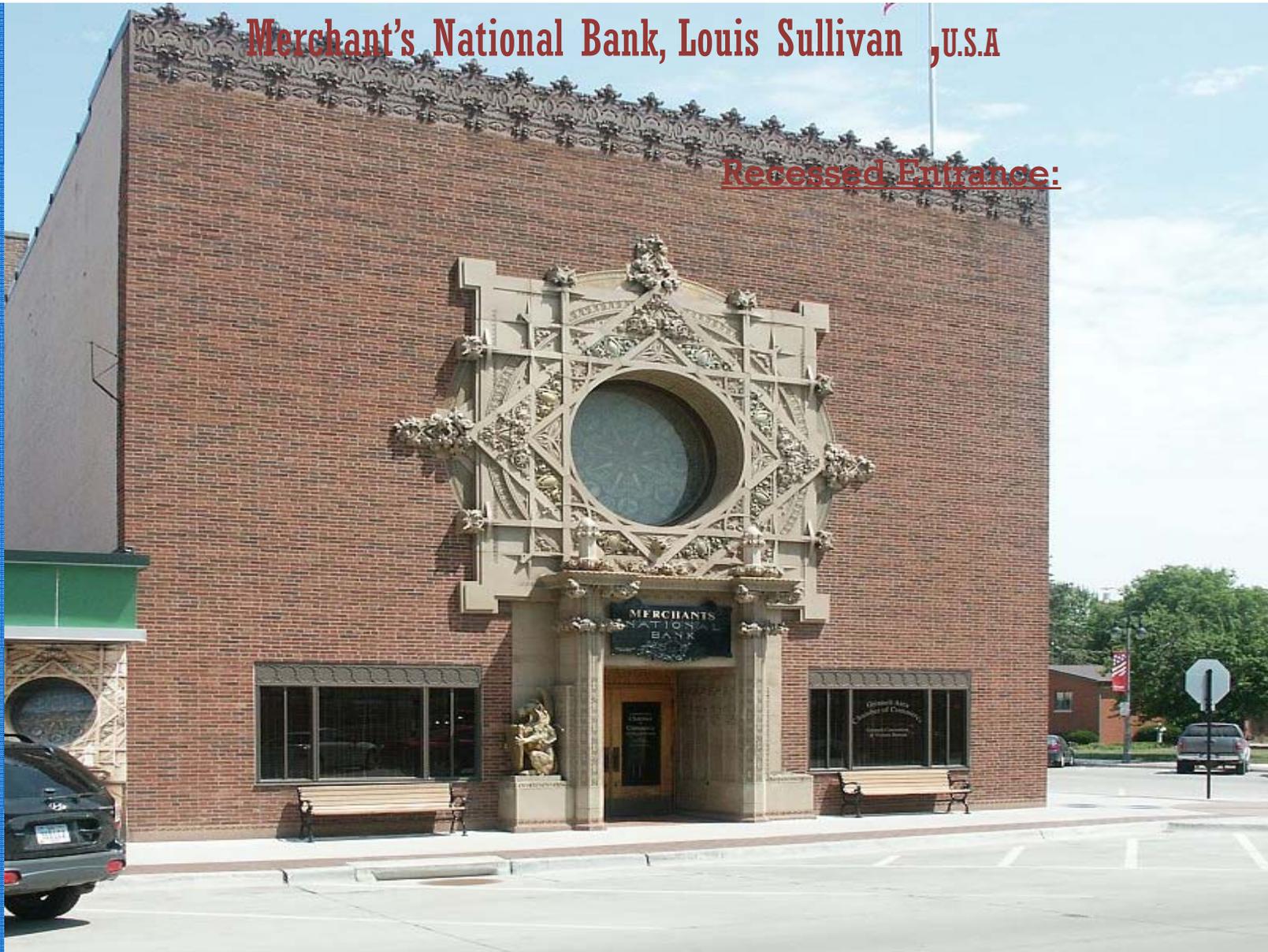


Venturi house
Pennsylvania, USA



Merchant's National Bank, Louis Sullivan ,U.S.A

Recessed Entrance:



PROJECTED



Mill owners association building
Ahmedabad , lecorbusier

RECESSED



National Gallery of Art, Washington .I.
M. Pei

Configuration of space- Sequence of spaces

1. Linear

- Straight path, primary organizing element. Curvilinear or segmented, have branches or form a loop.

2. Radial

- Linear path extending from or terminating at a central common point.

3. Spiral

- Single, continuous path originates from a central point, revolves around it & becomes increasingly distant from it.

4. Grid

- 2 sets of parallel paths that intersect at regular intervals & create square or rectangular fields.

5. Network

- Paths that connect established paths.

6. Composite

- Building employs combination of all the above.



1. Linear Path



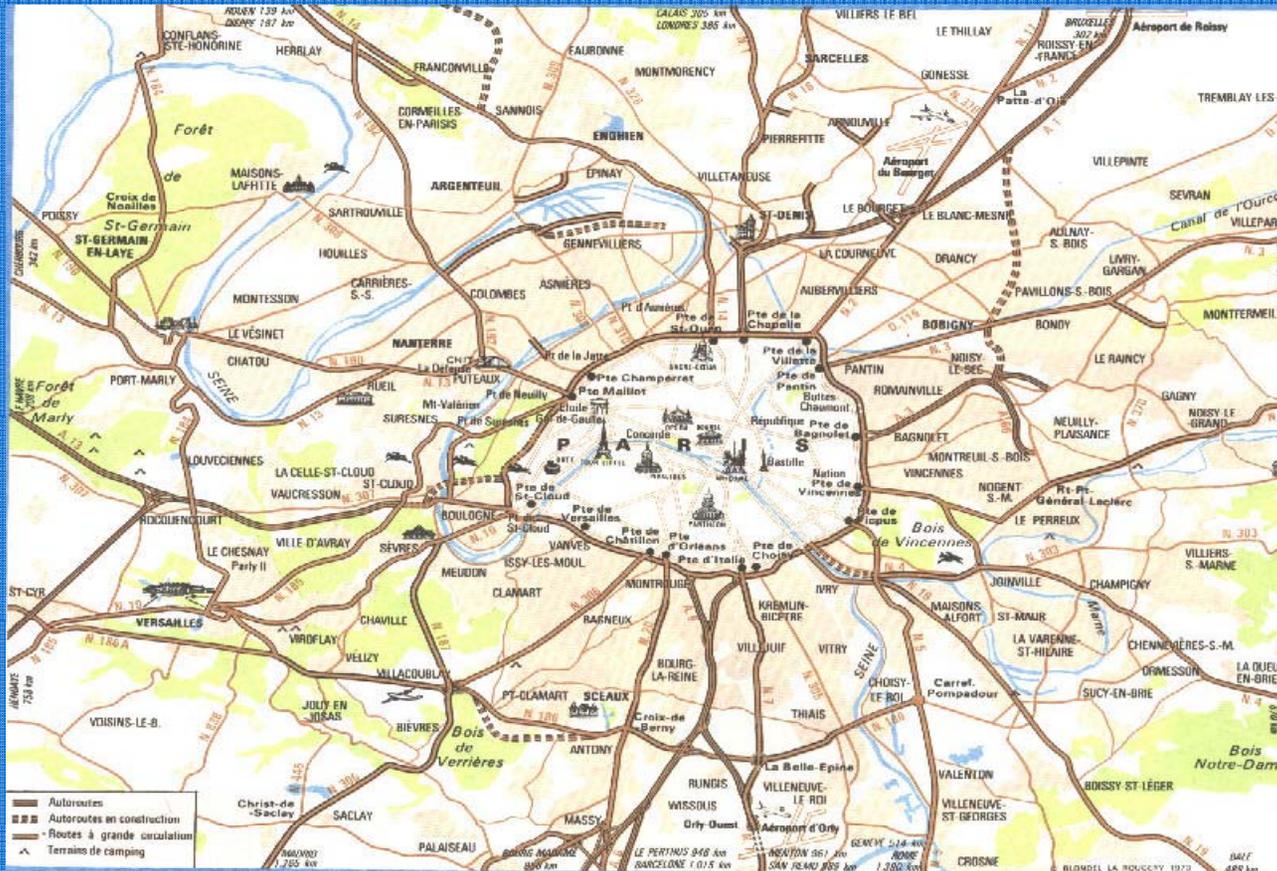
2. Radial path-Chickamauga Dam Southern U.S.



3. Spiral path - Great Salt Lake.



4. Grid Path: City of Chandigarh



5. Network : Paris



6. Composite path- Erbila

Path – space relationships, Edges, Nodes & Termination of path



1. Pass by Spaces:

- Integrity of each space maintained.
- Configuration of path is flexible.
- Mediating spaces used to link path with spaces.

2. Pass Through Spaces:

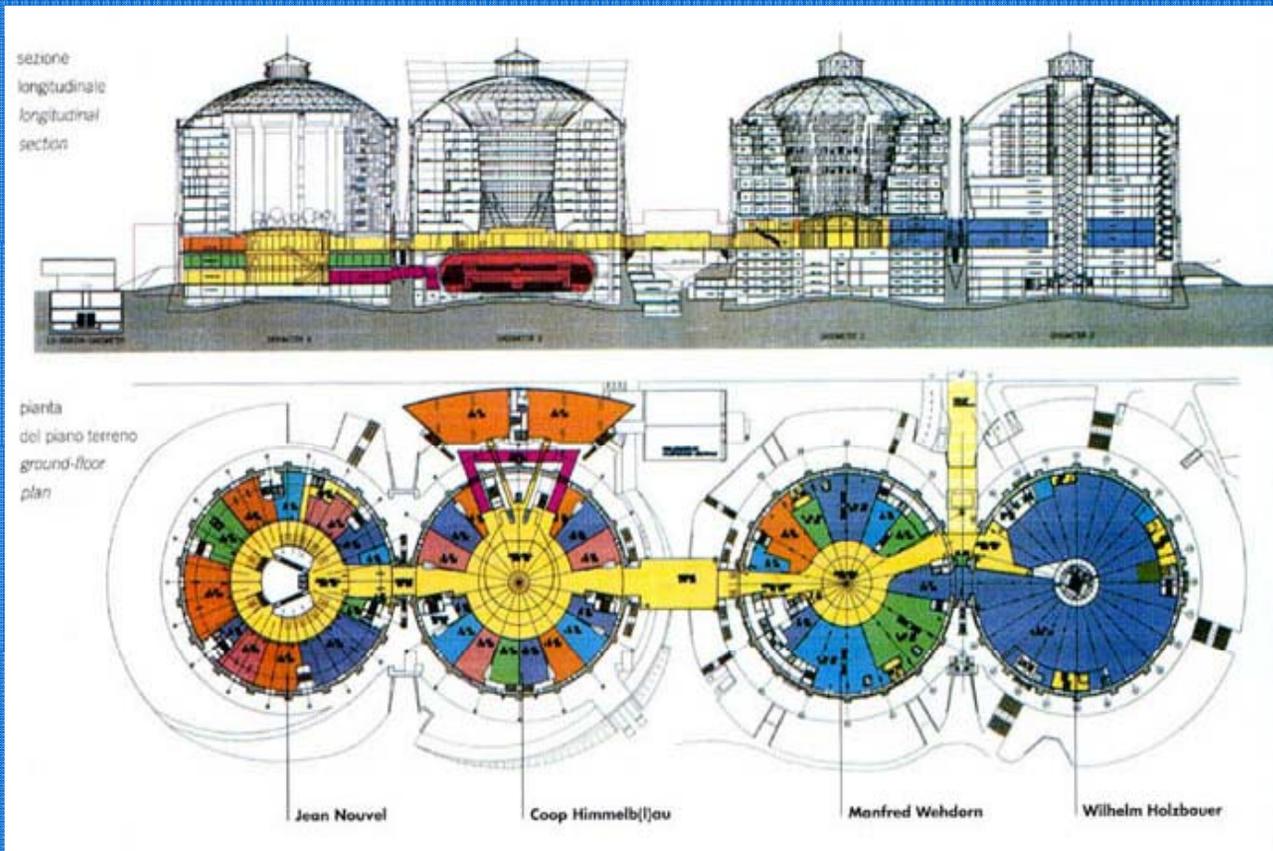
- May pass through Axially, Obliquely or along its edge.
- Cutting through the space creates patterns of rest & movement within it.

3. Terminate in a Space:

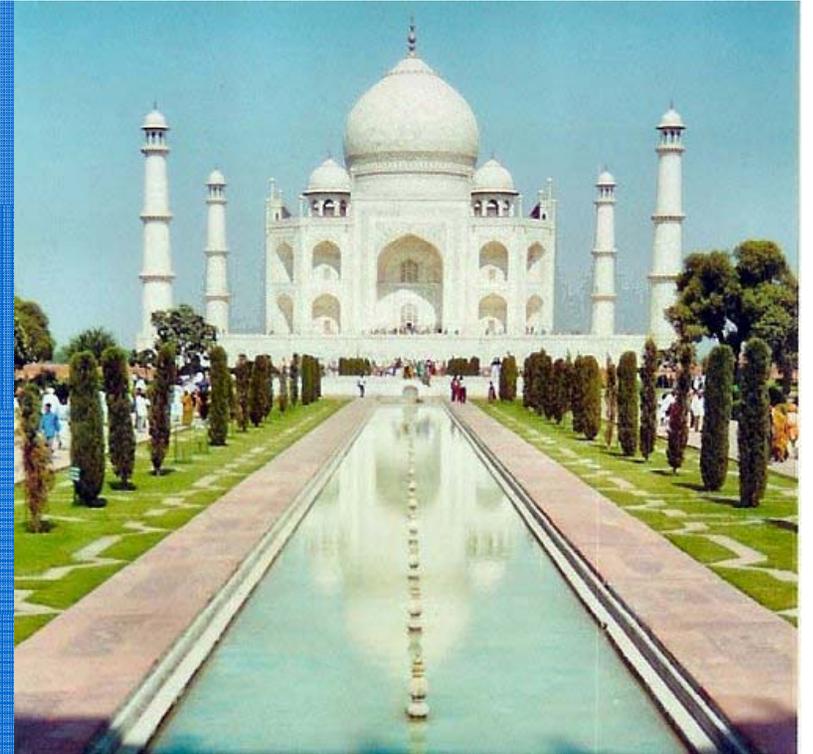
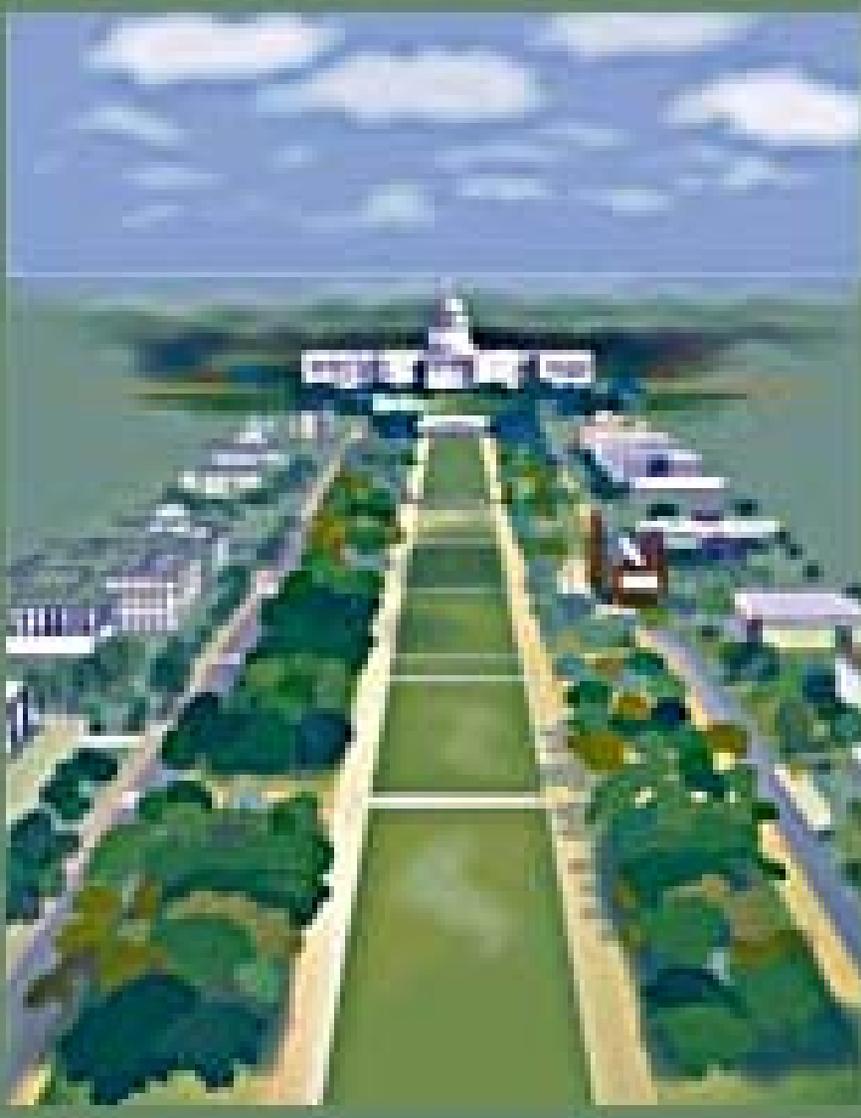
- Location of the space establishes the path.
- Used for functionally or symbolically important spaces.



1. Pass by Spaces:



2. Pass Through Spaces:



**3. Terminate in
a Space:**

Form of circulation Space-

Corridors, Halls, Galleries, Stairways & rooms.

- Spaces of movement-occupies a significant amount of volume of a building.
 - Form & scale of circulation space should accommodate movement of people as they promenade, pause, rest, or take in a view along a path.
- Form of circulation space varies according to:
- Its boundaries.
 - Its form relates to the form of the spaces it links.
 - Its qualities of scale, proportion, light & view are articulated.
 - Entrances open into it
 - It handles changes in level with stairs & ramps.

Various types:

1. Closed:

- Public galleria or private corridor that relates to the spaces it links through entrances in wall plane.

2. Open on one Side:

- Balcony or gallery provides visual & spatial continuity with the spaces it links.

3. Open on both Sides:

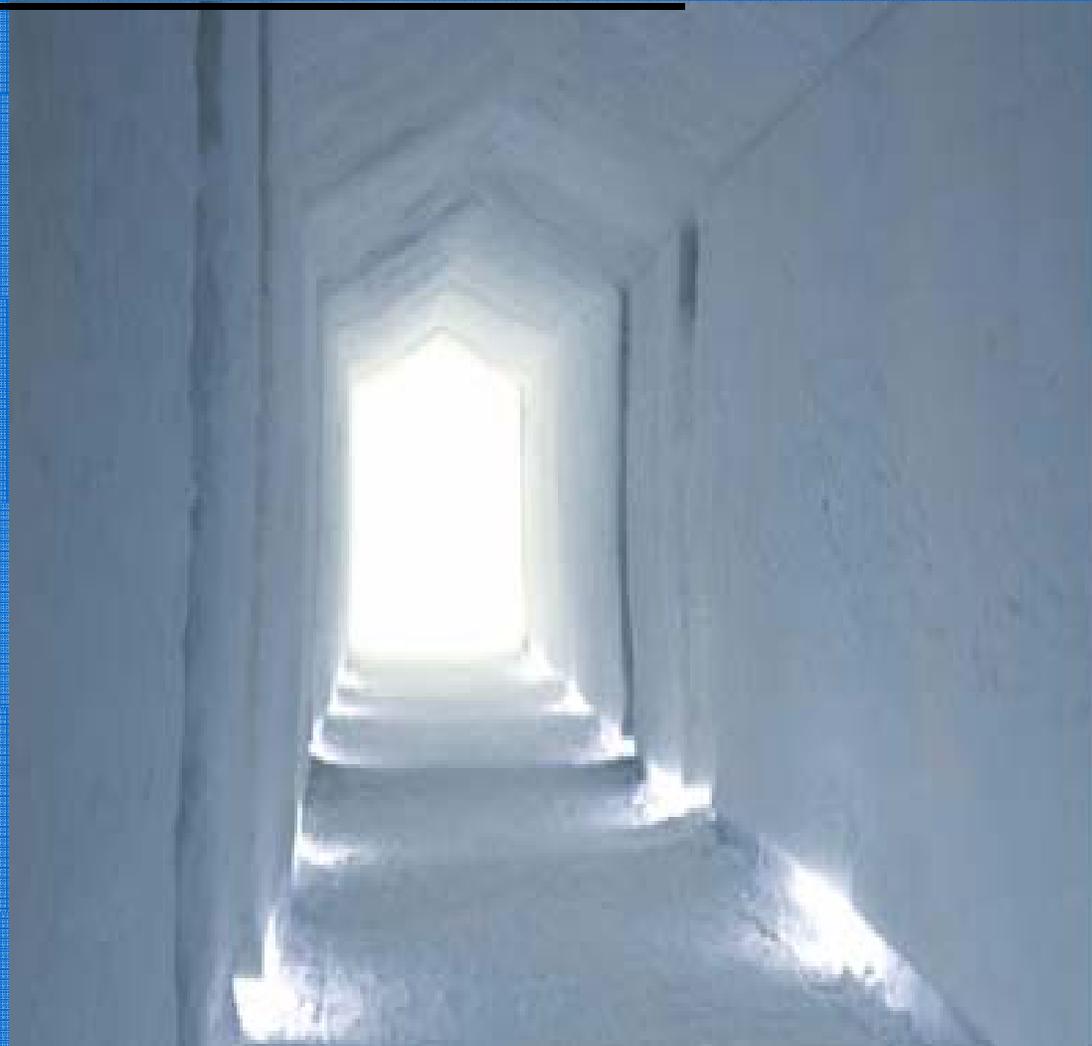
- Colonnaded passageways becomes a physical extension of the space it passes through.

- Width & Height should be proportionate- shows the difference in public promenade, private hall & service corridor
- Narrow spaces can be enlarged by merging with spaces it passes through.
- In large space, path can be random. They can be determined by activities & arrangements of furnishings within the space.



Closed on both sides

Closed on both sides



Closed on both sides





Open on one side



Closed on both sides



Open on both sides

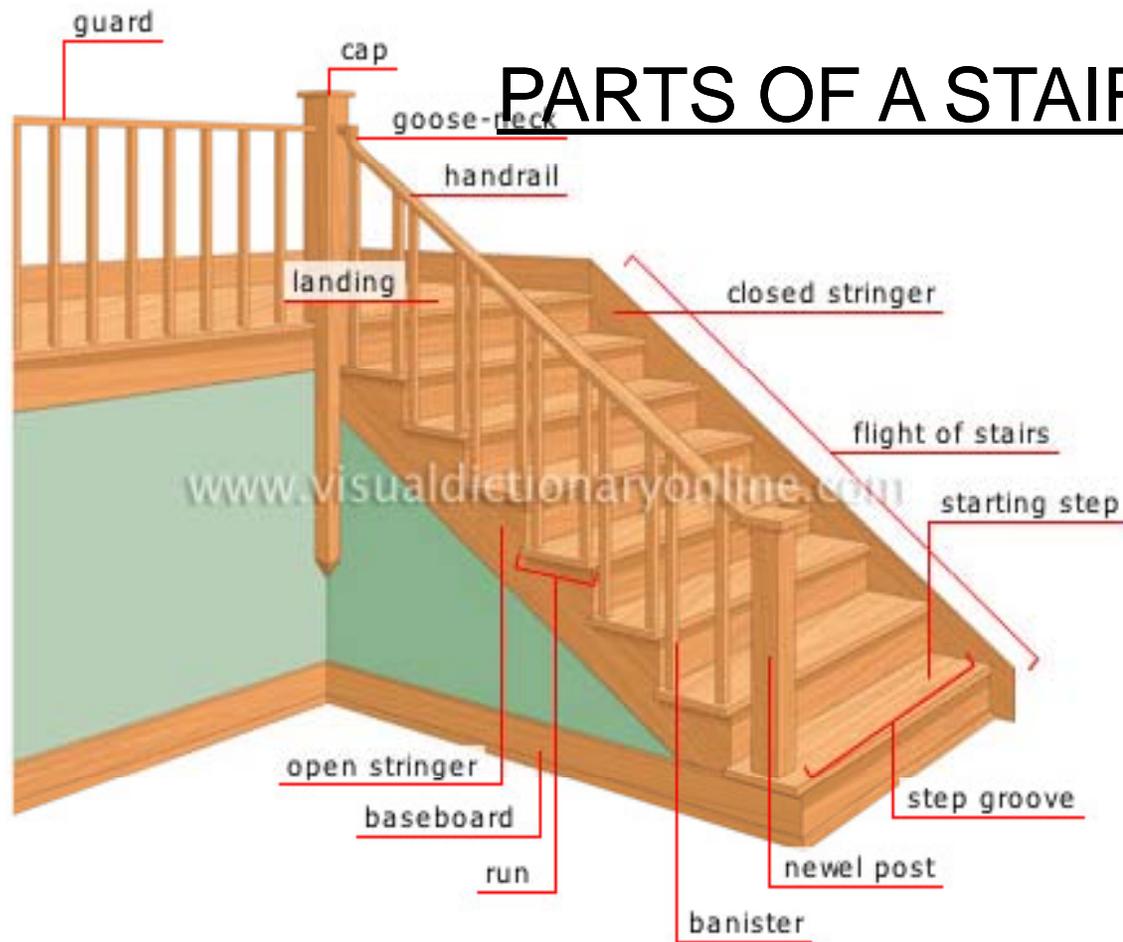
Grand Staircase, Paris opera house

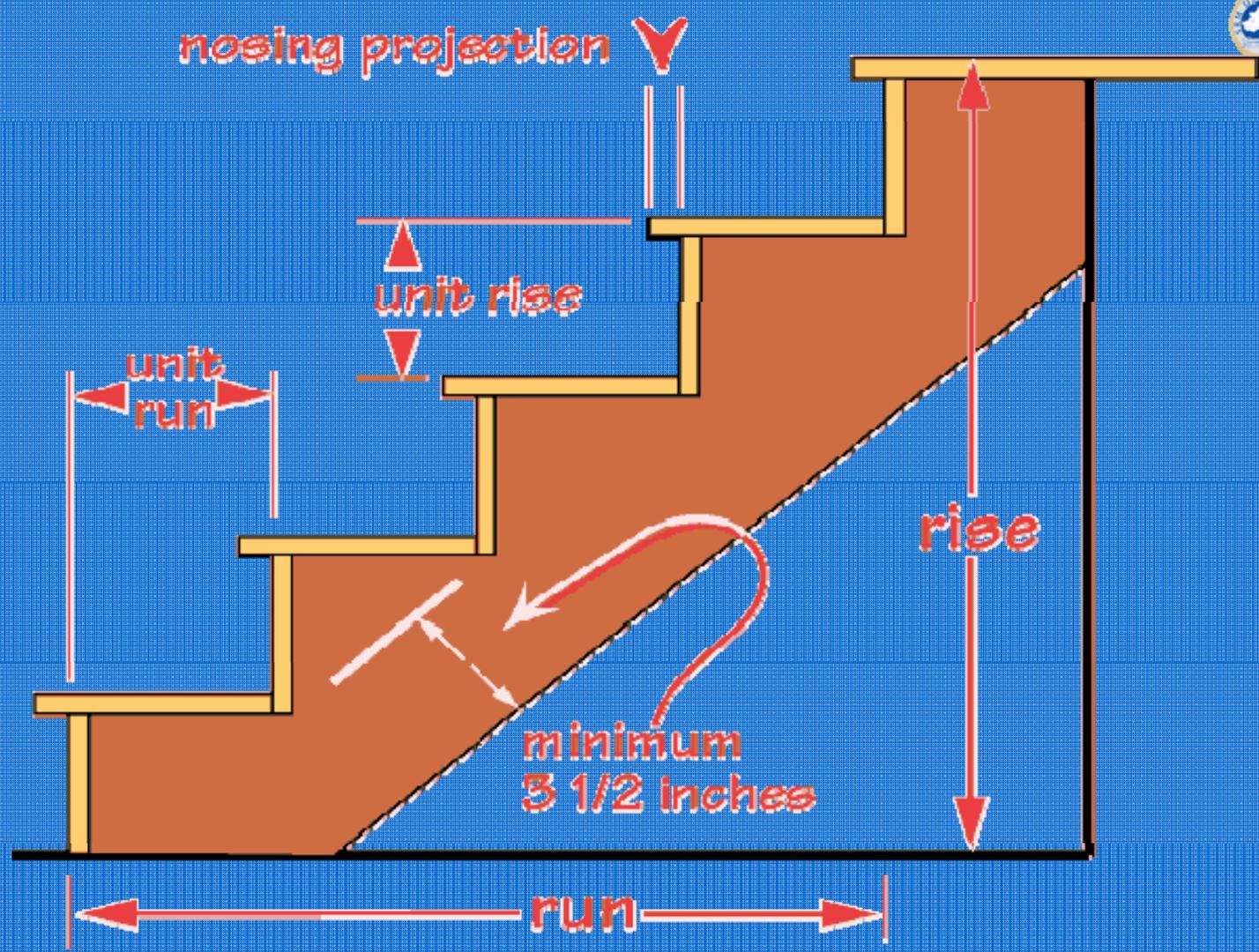


Stairways

- Provide vertical movement b/w levels of building or outdoor space.
- Means of vertical transport.
- Traversing up-privacy, aloofness or detachment
- Going down-secure, protected or stable ground.
- Landings-Rest, change in direction, access & outlook form stairway.
- Pitch & location of landings determine movement of the user.

PARTS OF A STAIR





Stairways

1. Straight-run Stair
2. L-Shaped Stair
3. U-Shaped Stair
4. Circular Stair
5. Spiral Stair



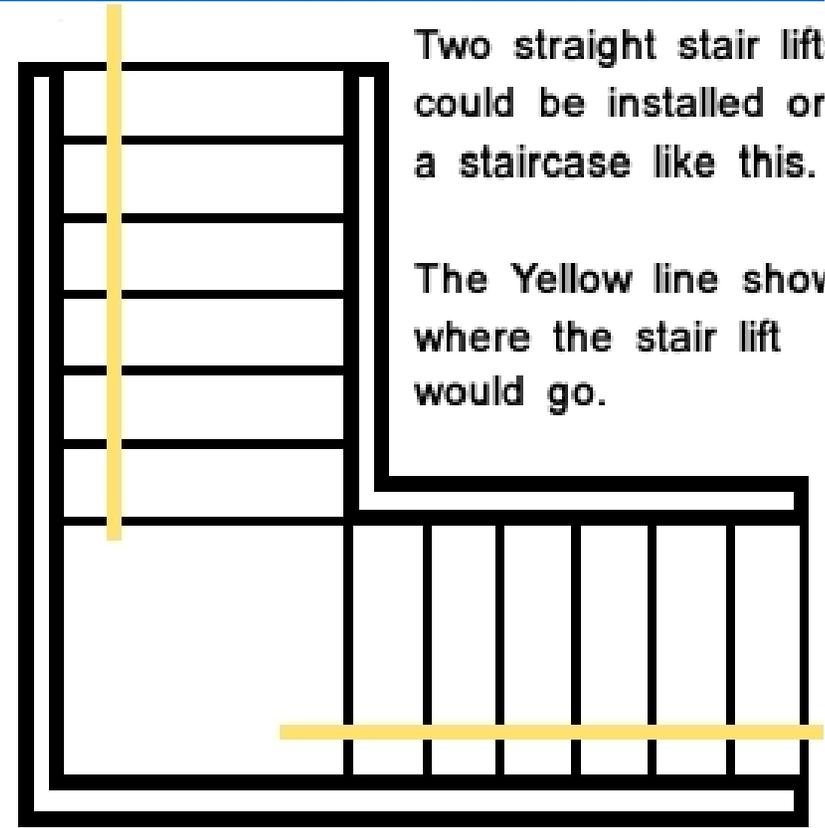
1. Straight-run Stair



1. Straight-run Stair



2. L-Shaped Stair



Two straight stair lift could be installed or a staircase like this.

The Yellow line show where the stair lift would go.



3. U-Shaped Stair



4. Circular Stair



5. Spiral Stair



Double Helix Stairs

Circulation Diagram for Residence & Restaurant

- **Derived from the Bubble Diagram.**
- **Related - Design process.**
- **Variation-Usage of Space by different Categories of Space.**

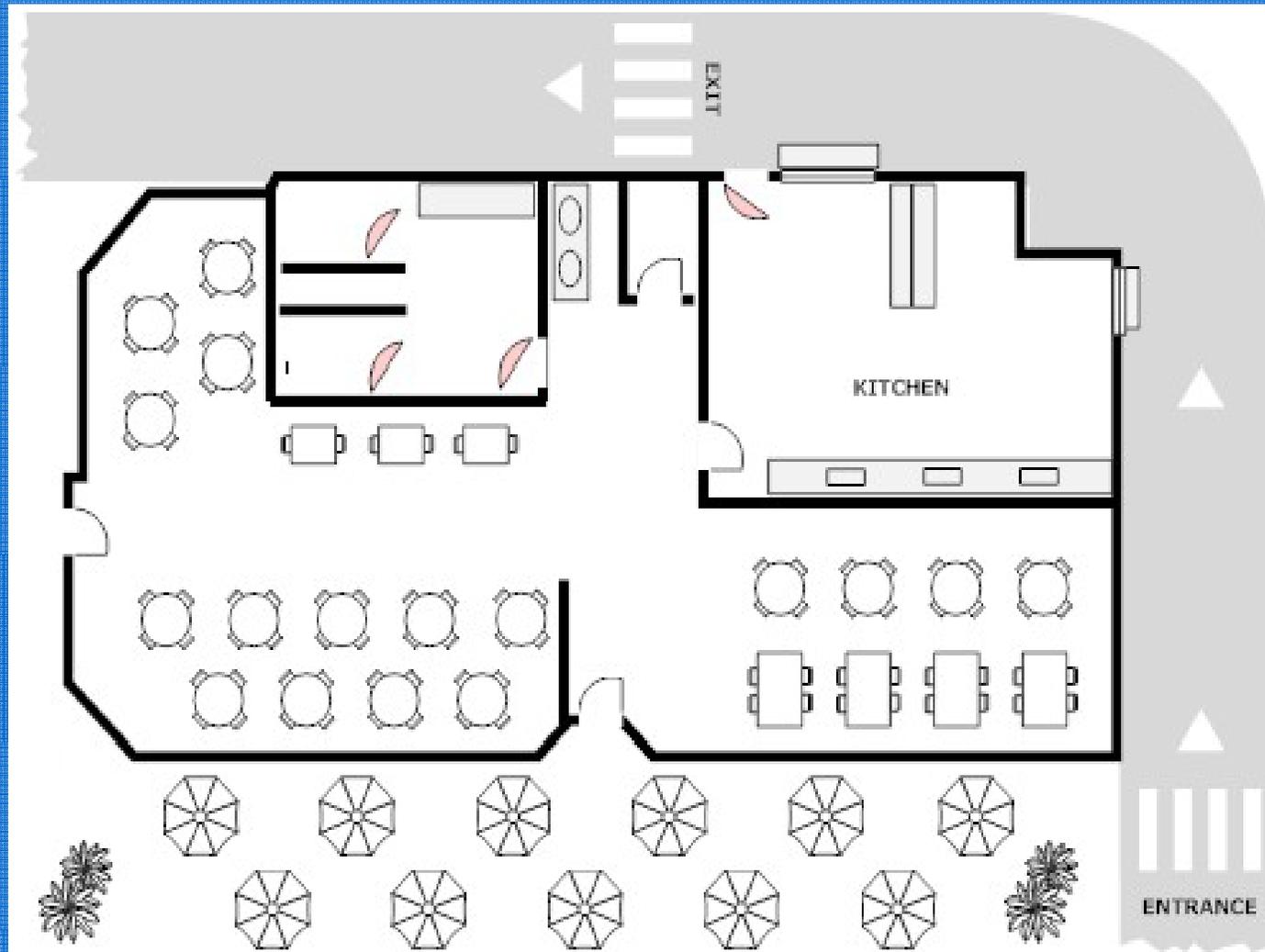
GROUND FLOOR PLAN



FIRST FLOOR PLAN



RESIDENCE







Unit -4

PRINCIPLES OF COMPOSITION



- Unity
- Dominance
- Harmony
- Vitality
- Emphasis
- Fluidity

□ Unity

- Principle of unity is concerned with VISUAL COMPOSITION in design.
- Visual composition produced by relationship between visual elements.
- Unity creates a feeling of wholeness. Unity is usually achieved when the parts complement each other in a way where they have something in common. Unity can be achieved by use of the same color, or different tints of it, or using a similar graphic style for illustrations.

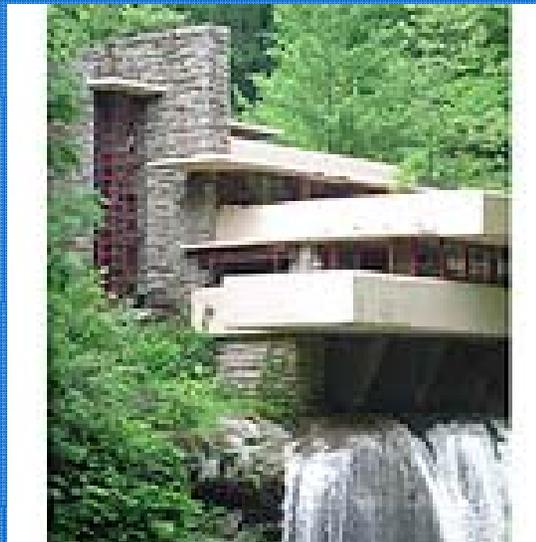
Aspects of unity are

- Dominance or self unity
- Harmony
- Vitality
- Balance

Elements of composition to be considered:

- 1.Texture
- 2.Color hue and tone
- 3.Direction
- 4.Proportion
- 5.Solid and void
- 6.Form or shape

Falling Water house-
Use of materials
and form are
dramatic but
harmonious.



Opera house –
rhythmic repetition of
petals show unity

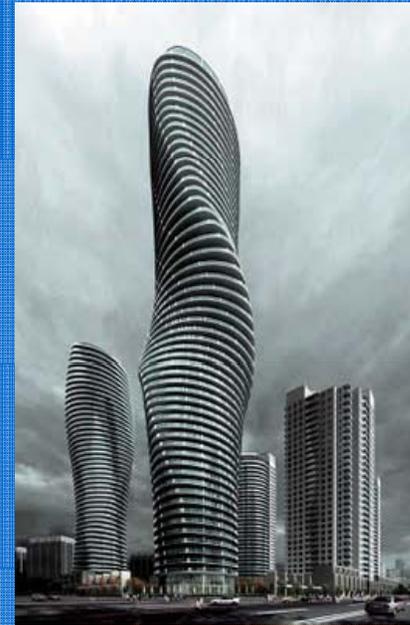


Solid – void – a
dominance

Chapel at Notre Damn
Du Haut , Paris

Self Unity

- ❑ Sphere or egg has self unity. Fish and birds have simplicity of forms. this gives an effect of self unity. Simple buildings produce such an effect.
- ❑ The detailed requirements of function and stability in buildings results in a number of visual elements.
- ❑ Roofs , walls, windows and doors provide colors, tones , texture , direction , solid and void.
- ❑ As the number of visual elements increases the competition increases.
- ❑ So the need is felt for visual dominant to avoid dualities or competition of equal interest.



Residential Apartments ,
Canada



Sphere building

Harmony



- Fitting together all parts to form a connected whole.
- In architecture , harmony can be described as the pleasing interaction or appropriate orderly combination of the elements in a composition.

Harmony can be of

- Color , tone
- Direction
- Proportion , form
- Repetition of forms or shapes can be used to produce rhythm and harmony
- Texture

Examples



Harmony – Taj Mahal

Harmony by :

- Composition
- geometry
- Direction
- texture
- Proportion



Harmony by repetition
Ducal Palace

□ Harmony

Harmony in Greek temple by:
Balance inherent in bilateral
symmetrical plan
Unity achieved by tension between
vertical column and horizontal
entablature



Dominance

The element given the most visual weight, the element of primary emphasis. The dominant element will advance into the foreground in a composition.

One of the aspect of dominance is emphasis and vitality.

Vitality

It is provided mainly by contrast.

- Contrast can be of color , tone , texture , direction , proportion , solid , void.
- But too many contrasting elements or too much of contrast
- Will impair harmony and tend to produce a multiplicity of equal interests.
- This tends to reduce dominance and weakens unity.

Vitality

- CONTRAST of color, tone
- texture, direction
- proportion
- solid and void
- Vitality should not be sought at the expense of harmony

VITALITY

- the facade of the building consists of two elements that make it contrast to the city with organic approach.



Pedregal Shopping Centre , in Mexico



Huski Apartments, U.S.A

Radial in nature, the building responds to the delicate surrounding environment.

EMPHASIS

- Stress, Accent or Prominence
- A forcible or impressive expression
- An insistent or vigorous way of attributing importance or enforcing attention
- Horizontal or vertical dominance by the composition of forms.
- By surface articulation ,Linear pattern of windows
- Vertical projecting columns ,Fins on the surface, bands,
- Roof projections
- Textures etc



Toyo Ito
The facade of criss-crossed concrete braces reinterprets the silhouettes of the elm trees lining the street.



Serpentine Gallery Pavilion (2002) in London.



NEW ARTS BUILDING , England

Fluidity



- Fluidity in architecture can be achieved in the composition as well as spaces.
- As an impression of flow , of movement that is smooth and graceful

Pavilion called Leonardo Glass Cube in Germany



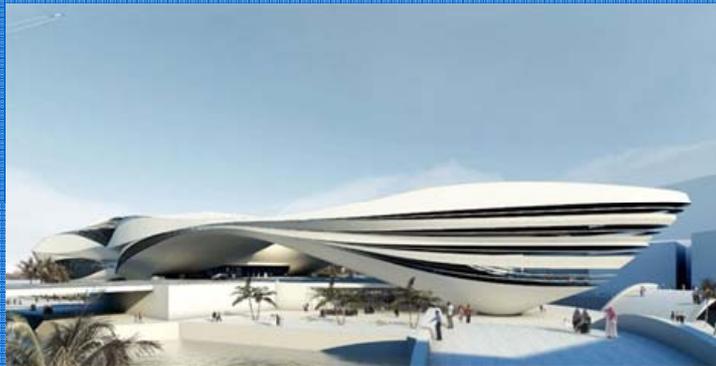
Concrete bracing goes
with the pavement



Different levels shows fluidity

Geometry Fluidity House

UN Studio for Dubai Museum



Ben van Berkel architect

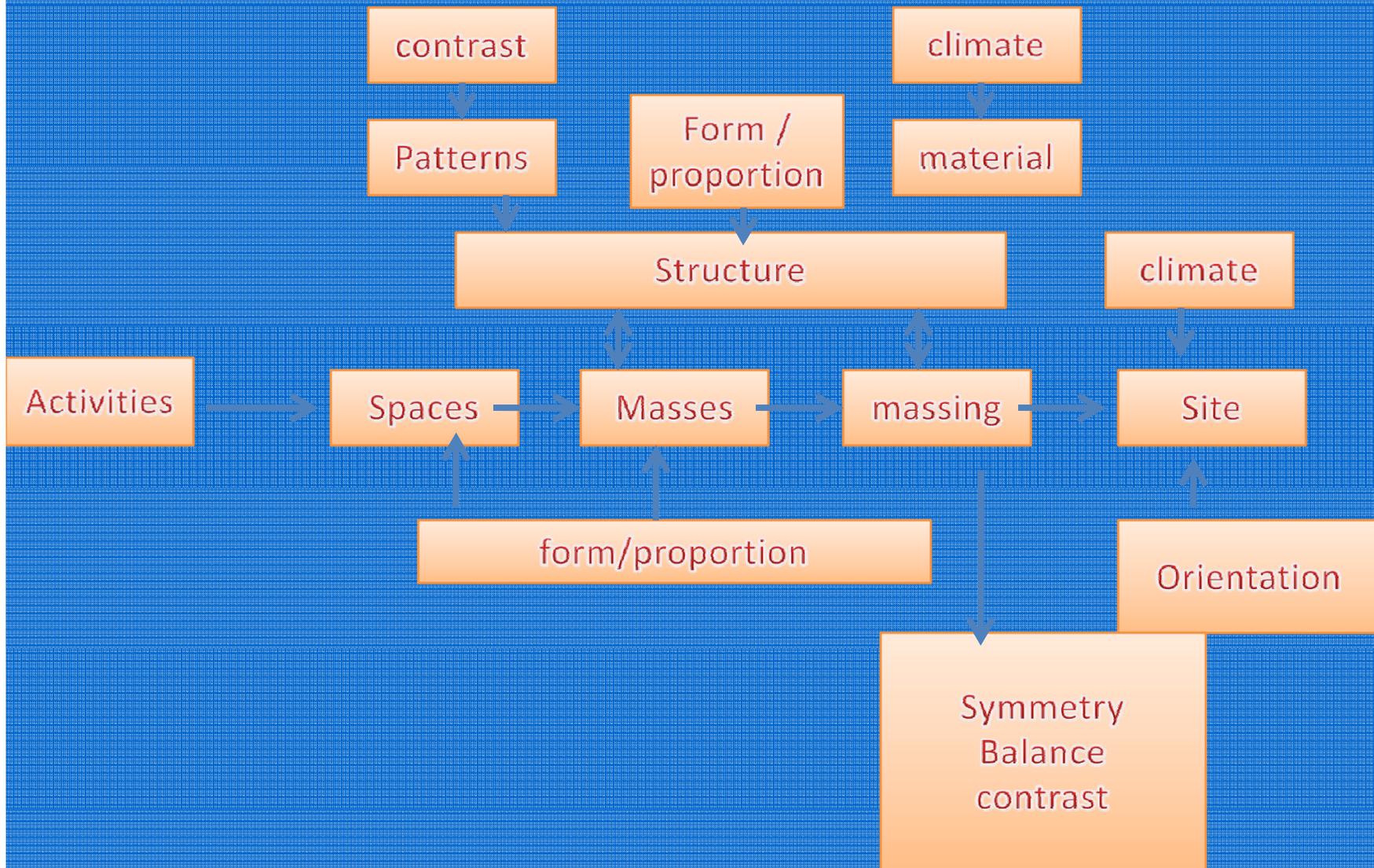
UNIT-5

Design process and Analysis of building

- Design process – integration of aesthetics and function
 - Understanding of formative ideas
 - Organization concepts
 - Spatial characteristics
-
- Massing and circulation in design analysis of the following buildings :
 - Falling water house
 - Guggenheim museum by F.I.wright

 - Villa savaoye
 - Chapel of Notre damn du haut by Lectorbusier

Integration of aesthetics and function



The Process of Design

- ◆ Architecture is the story of ideas, dreams and inspirations
- ◆ Design is the process of translating these ideas in to reality
- ◆ This is done in two stages- MENTAL and REPRESENTATIONAL
- ◆ In the first stage the problem is analysed, understood contextually and a solution is thought of
- ◆ In the second stage, the solution is brought out in the form of sketches, drawings and or models to explain the idea

The Design Process — Various stages

- ◆ Site Visit
- ◆ Site Analysis and References
- ◆ Evolving a concept
- ◆ Client brief
- ◆ Schematic design
- ◆ Design development
- ◆ Drawings for Approval
- ◆ Working drawings and structural drawings
- ◆ Construction documentation
- ◆ Tender documents and tender
- ◆ Actual Construction and supervision

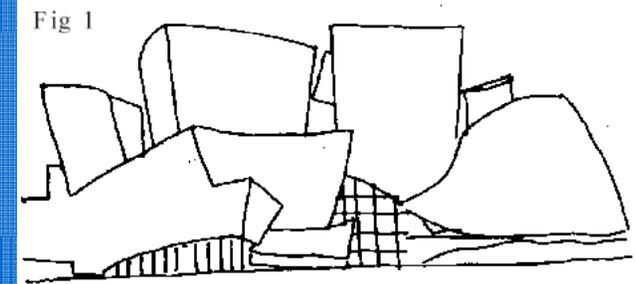
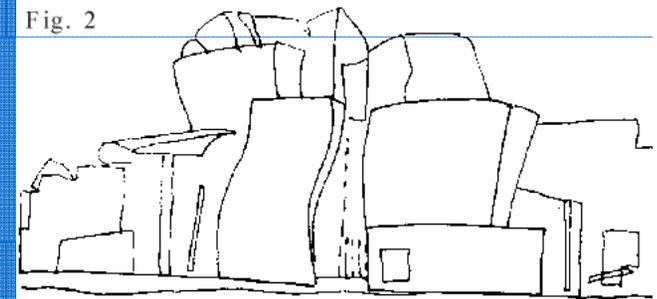
ANALYSIS OF A BUILDING

We can analyze the architecture of a building in many different ways. Let us name three main categories:

Formal analysis -formal analysis is the most important because it can show us a thin line that divides architecture from construction (or, the construction industry), and it can also show us architecture as an art. Analysis can be done by means of diagram relationship of plan elevation and section part and whole

Functional analysis

Structural analysis



□ ANALYSIS CAN BE DONE BY MEANS OF
DIAGRAM

□ RELATIONSHIP OF PLAN ELEVATION AND
SECTION

□ PART AND WHOLE

1. Technical information

- site plan
- plans, sections, elevations
- interior and exterior perspectives

2. Personal interpretation

- schematic diagrams of plans / sections / elevations that explain:

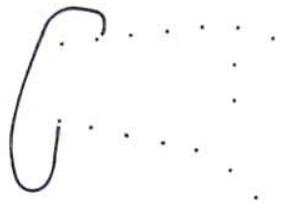
- | | |
|---|--|
| <input type="checkbox"/> relation with the site | <input type="checkbox"/> proportions |
| <input type="checkbox"/> geometries that govern the project | <input type="checkbox"/> relation between mass and void (volume and surface) |
| <input type="checkbox"/> relations between volumes | <input type="checkbox"/> grids |
| <input type="checkbox"/> main and secondary axis | <input type="checkbox"/> structure |
| <input type="checkbox"/> main and secondary volumes | <input type="checkbox"/> layers |
| <input type="checkbox"/> vertical and horizontal circulations | <input type="checkbox"/> access |
| <input type="checkbox"/> light | <input type="checkbox"/> Relation between spaces in section |
| <input type="checkbox"/> composition of facades | <input type="checkbox"/> Scale |
| <input type="checkbox"/> materials and relation between materials | <input type="checkbox"/> Symmetry |
| <input type="checkbox"/> relation between various components of the program | <input type="checkbox"/> Balance |
| | <input type="checkbox"/> axis |

NOTRE D'AMN DUE HAUT CHAPEL

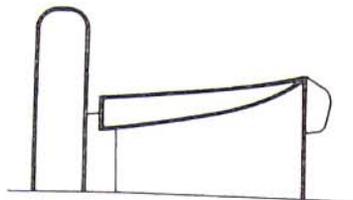
- ❑ Notre damn due haut chapel is one of lecorbusier's most original , least controversial and widely admired building.
- ❑ The building is the relief from the severity and logic and the international style , though it confirms with the system of proportional dimensions (modulator)
- ❑ The building demonstrated that the most rational of architects could design , a building that is essentially personal and poetic , a work of sculpture in concrete which springs from faith nor reason.



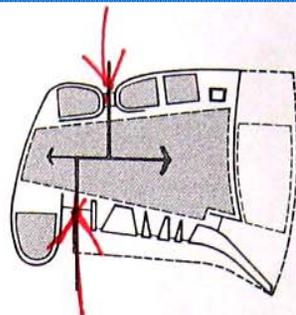
- ❑ In the words of the architect ' I sought to create a place of silence, of prayer , peace and inner joy. An experimental form probably inspired by the landscape.
- ❑ One can read in the forms the dual function he wanted to give the building
 - a small chapel for prayer / meditation.
 - place of worship – vast crowd of pilgrims
- ❑ The idea of deep grotto for the small chapel – by effects of soft , round masses that surround the observer and give reassurance.
- ❑ Though the form in no way correspond to that of a traditional roman church , it had the same sacred atmosphere , bulky volumes , thick walls , deep splays and semi darkness. Thus it exhibits implicit bond with the past.



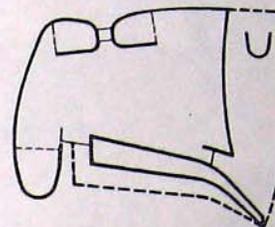
STRUCTURE



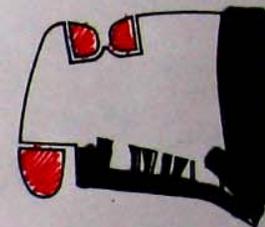
PLAN TO SECTION



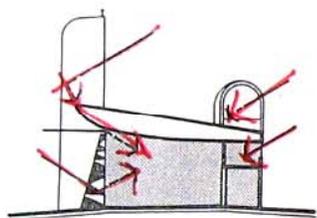
CIRCULATION TO USE



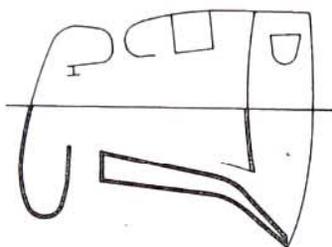
UNIT TO WHOLE



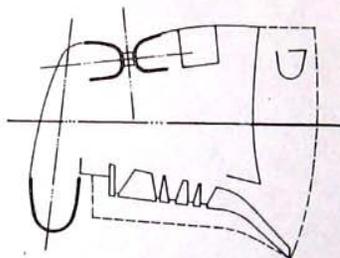
ADDITIVE AND SUBTRACTIVE



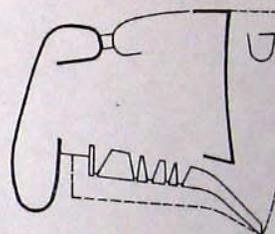
NATURAL LIGHT



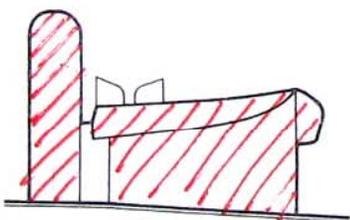
PLAN TO SECTION



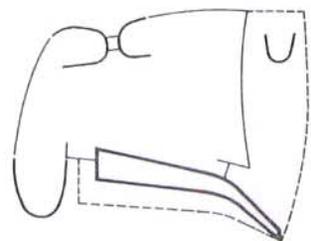
SYMMETRY AND BALANCE



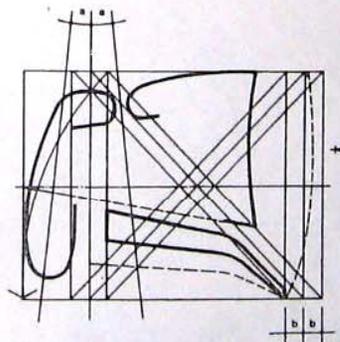
HIERARCHY



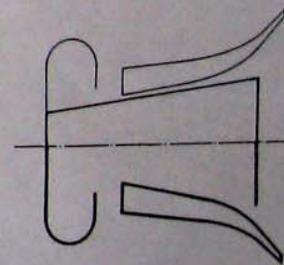
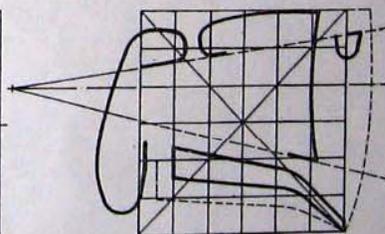
MASSING



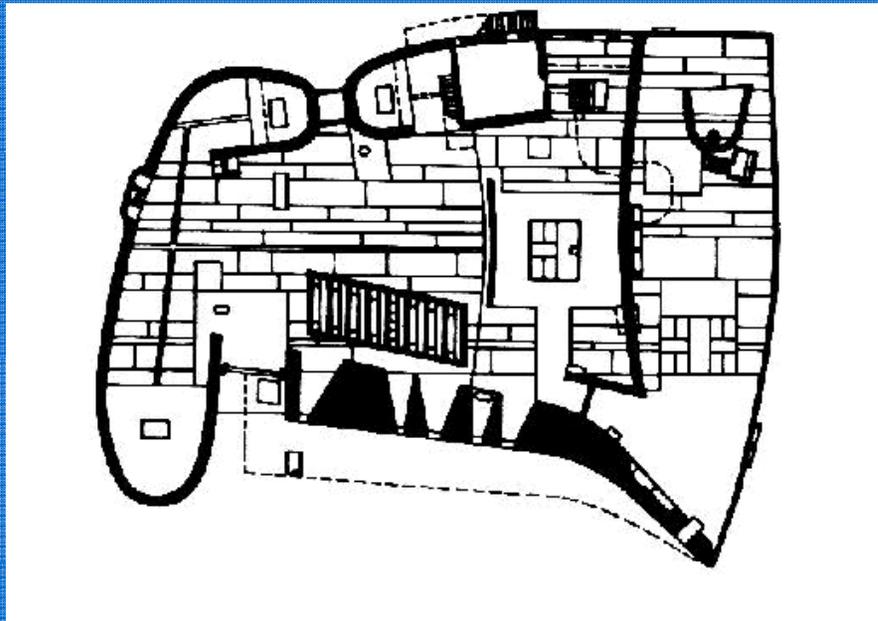
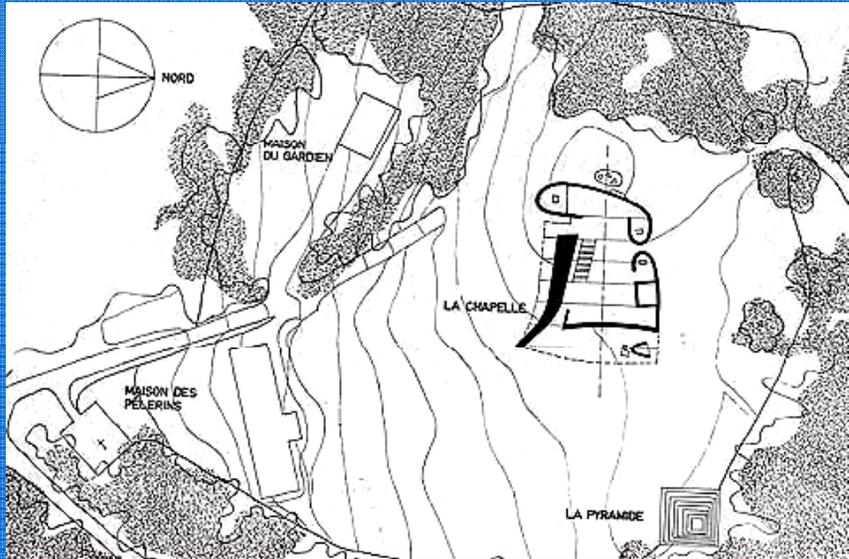
REPETITIVE TO UNIQUE



GEOMETRY



PARTI



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V.S.Pramar, *Design Fundamentals in Architecture*, Somaiya Publications, New Delhi, 1973