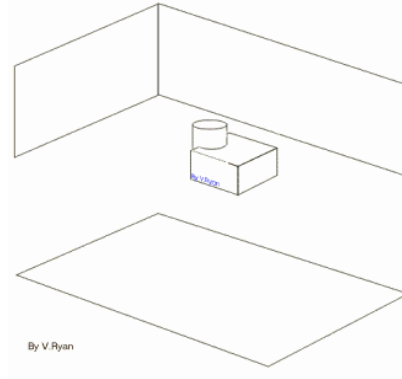




## İzdüşüm ve Görünüşler

- Bir parçanın üç boyutlu şeklini iki boyutlu kağıt düzleminde ifade edilmesi gerekir.
- Bunun için izdüşüm kurallarına uyularak, belirli yerlere ve yeterli sayıda çizilmiş izdüşümlere ihtiyaç vardır.



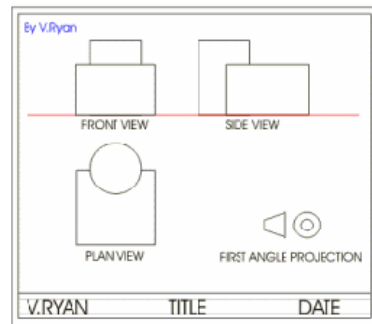
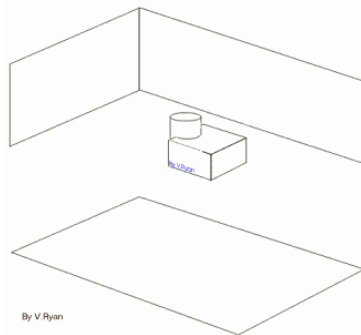
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1



### 3. Orthographic & Multi-view Projection

*Ortho* – Greek word meaning perpendicular  
Show the views of an object projected in 2-D  
Usually the top, front, and right side views



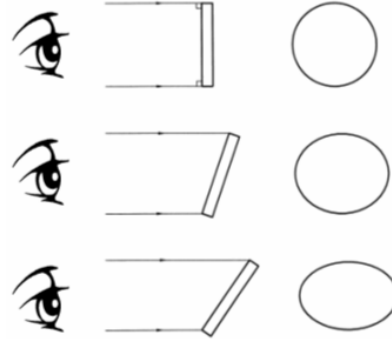
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## Paralel dik izdüşüm

- Paralel dik izdüşüm yönteminde teknik resmi çizilecek cisme dik açıyla bakılarak, çizim kağıdı üzerinde görünüşü elde edilir.
- Cismin bakış doğrultusuna göre eğilmesiyle ortaya gerçek boyutlarında ve formunda olmayan görünüşler elde edilir

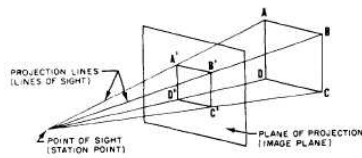


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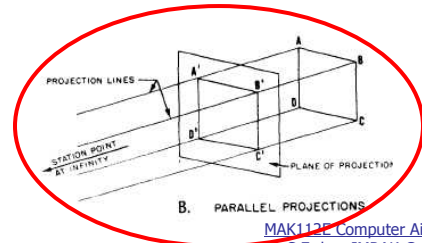
3



## 3. Orthographic & Multi-view Projection

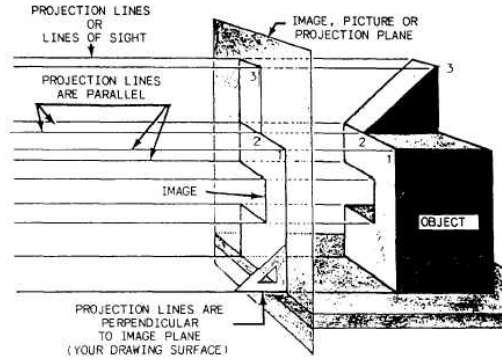


A. PERSPECTIVE PICTORIAL PROJECTION



B. PARALLEL PROJECTIONS

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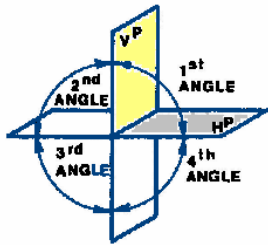
4



### 3. Orthographic & Multi-view Projection

#### Orthographic Projection

Orthographic projection is a method of producing a number of separate two-dimensional inter-related views, which are mutually at right angles to each other. Using this projection, even the most complex shape can be fully described.



Orthographic projection is based on two principal planes — one horizontal (HP) and one vertical (VP) — intersecting each other

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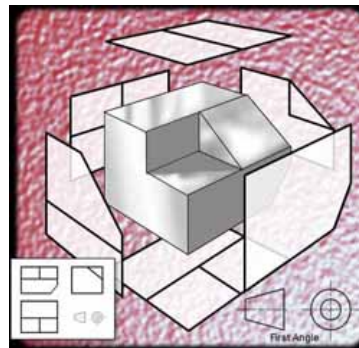
5



### 3. Orthographic & Multi-view Projection

**Orthographic projection** is a means of representing a (3D) object in (2D).

It uses multiple views of the object, from points of view rotated about the object's center through increments of  $90^\circ$ .



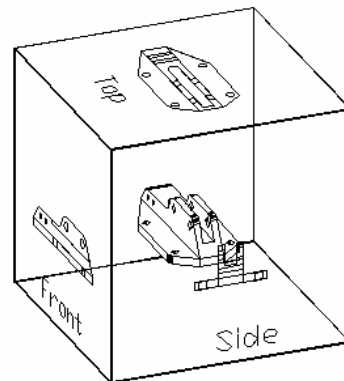
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### 3. Orthographic & Multi-view Projection

The views may be considered to be obtained by rotating the object about its center through increments of  $90^\circ$ .



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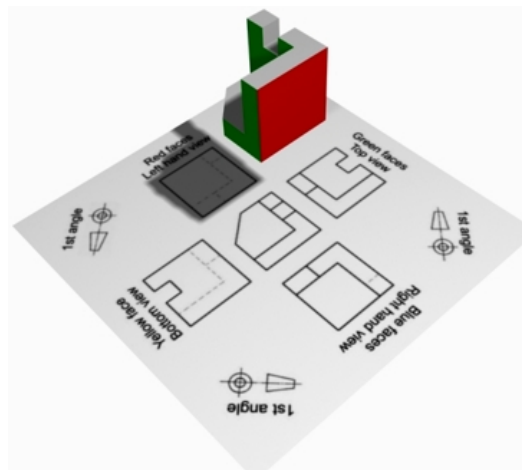
7



### 3. Orthographic & Multi-view Projection

*Orthographic Projection* is a way of drawing an object from different directions.

Usually a front, side and plan view are drawn so that a person looking at the drawing can see all the important sides.



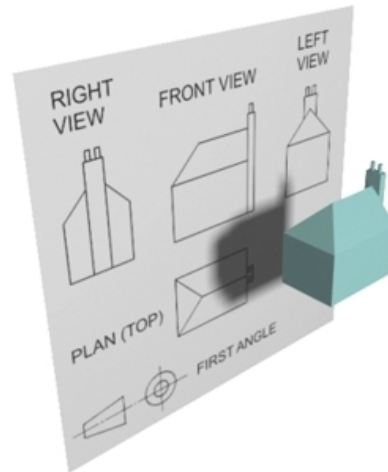
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### 3. Orthographic & Multi-view Projection

Orthographic drawings are useful especially when a design has been developed to a stage whereby it is almost ready to manufacture.



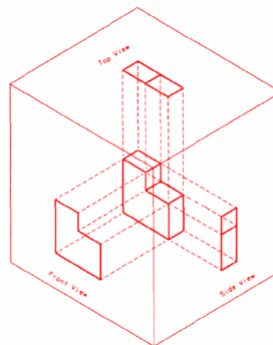
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### 3. Orthographic & Multi-view Projection

Imagine the object is surrounded by a glass cube. Object surfaces are projected onto the faces.



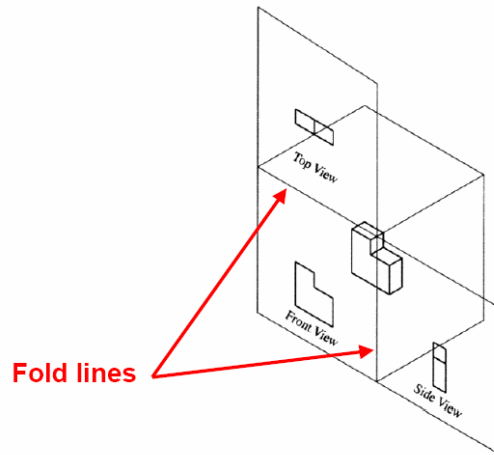
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### 3. Orthographic & Multi-view Projection

Unfold the cube  
so that it lies in a  
single plane  
Three views of the  
object are now  
visible on the  
same plane in  
space



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### 3. Orthographic & Multi-view Projection

#### Multi-view Projection

The goal in engineering graphics, whether it is freehand sketching or CAD, is to represent a physical object. Objects can be shown as *3-D projections* or *Multiview projections*.

Multi-view (multiplanar) projection is a method by which the exact shape of an object can be represented by two or more separate views produced on projection planes that are at right angles to each other.

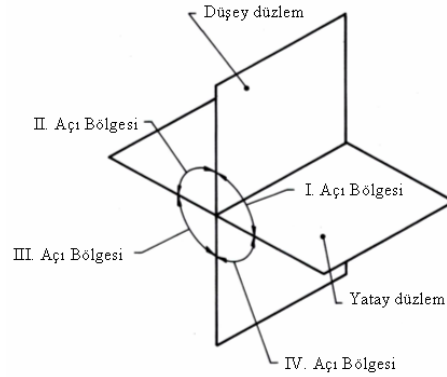
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### 3. Orthographic & Multi-view Projection

Birinci Açı Metodu veya ISO-E Metodu denir.  
Amerika'da ise III. Bölge esas alınarak görünüşler çıkarılır.  
Bu yöntem ise 3. Açı Metodu veya ISO-A Metodu denir.



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### İzdüşüm Sembolü

- Teknik resimlerin hangi izdüşüm yöntemine göre çizildiğini belirtmek için antetin sol tarafına konulur.

			İTÜ. Makina Fakültesi Teknik Resim Birimi		
	Ölçek	Kontrol	Fakülte	Söm	Adı Soyadı
			Makina		
			Ödev no:	Teslim tarihi:	

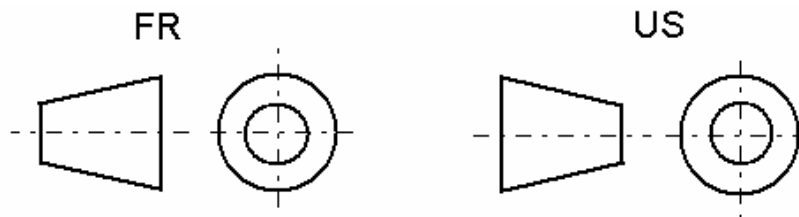
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### 3. Orthographic & Multi-view Projection

- On engineering drawings, the projection angle is denoted by an international symbol consisting of a truncated cone, respectively for first-angle (FR) and third-angle (US):



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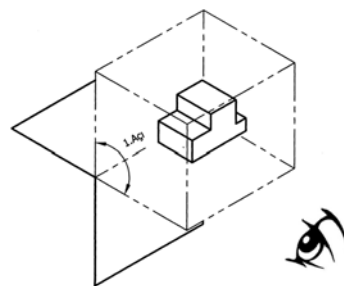
### 3. Orthographic & Multi-view Projection

#### First Angle Projection (ISO-E)



In first-angle projection, an object is positioned in the space of the first-angle quadrant between two planes.

A view of the object is projected by drawing parallel projecting lines, or projectors, from the object to the vertical principal plane (VP).



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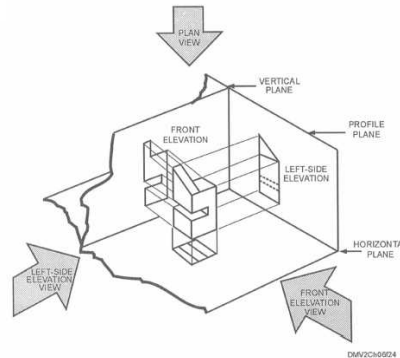
### 3. Orthographic & Multi-view Projection

#### First Angle Projection (ISO-E)



When the glass cube is unfolded:

- ♦ Front view: Height and Width
- ♦ Top view: Width and Depth
- ♦ Right view: Depth and Height



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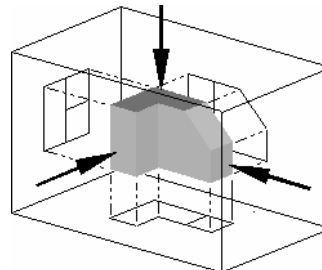
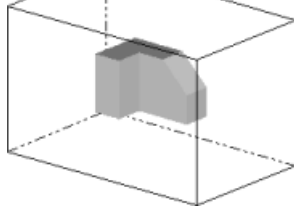
17



### 3. Orthographic & Multi-view Projection



Extending to the 6-sided box, each view of the object is projected in the direction (sense) of sight of the object, onto the (opaque) interior walls of the box; that is, each view of the object is drawn on the opposite side of the box:



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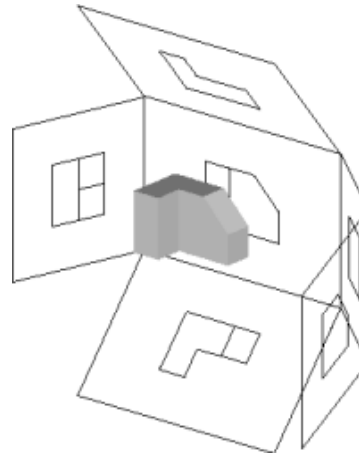
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### 3. Orthographic & Multi-view Projection



- A two-dimensional representation of the object is then created by "unfolding" the box, to view all of the **interior** walls:

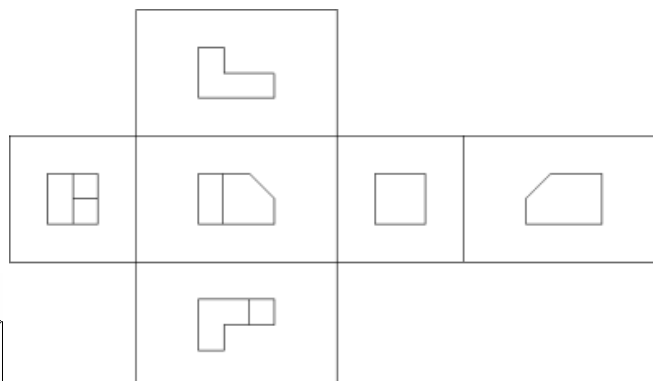
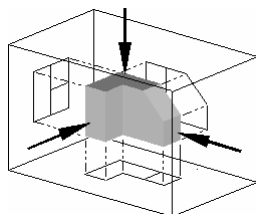


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### 3. Orthographic & Multi-view Projection

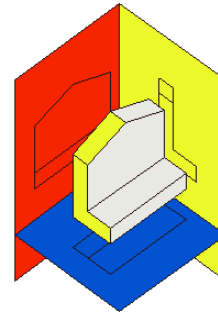
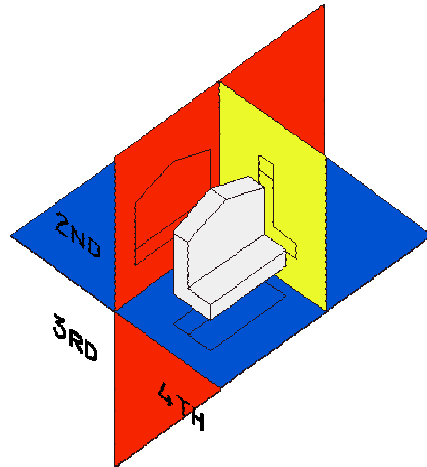


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### 3. Orthographic & Multi-view Projection

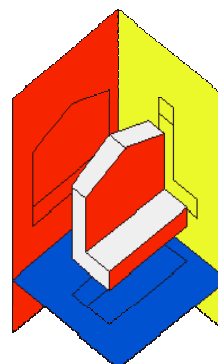
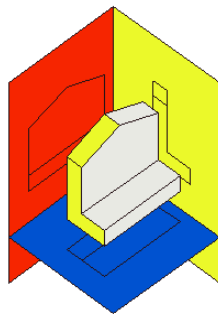


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### 3. Orthographic & Multi-view Projection

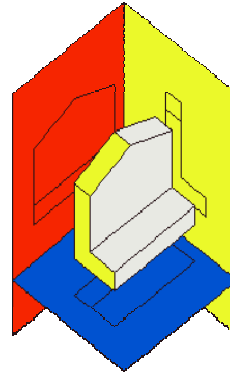
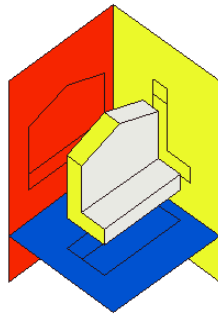


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### 3. Orthographic & Multi-view Projection

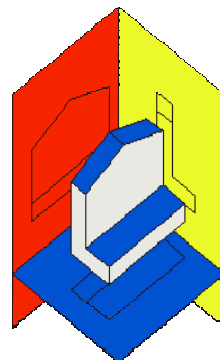
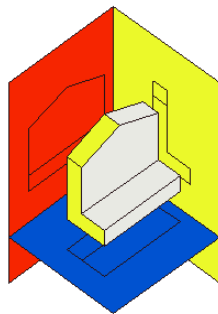


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### 3. Orthographic & Multi-view Projection

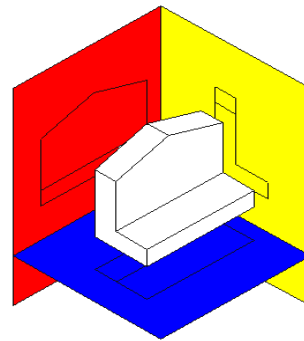
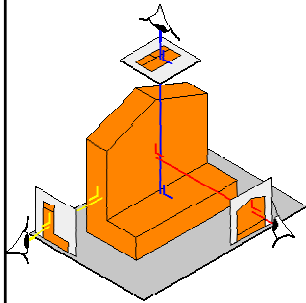


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### 3. Orthographic & Multi-view Projection



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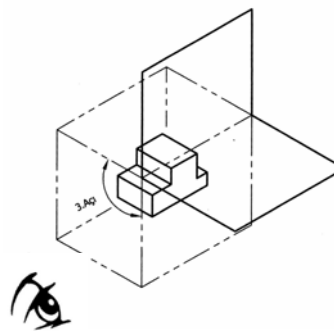


### 3. Orthographic & Multi-view Projection



#### Third Angle Projection (ISO-A)

In third-angle projection, an object is positioned in the space of the third-angle quadrant between two principal planes.

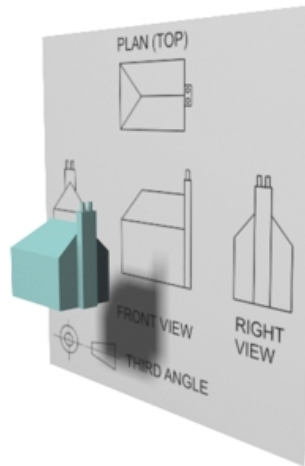


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### 3. Orthographic & Multi-view Projection

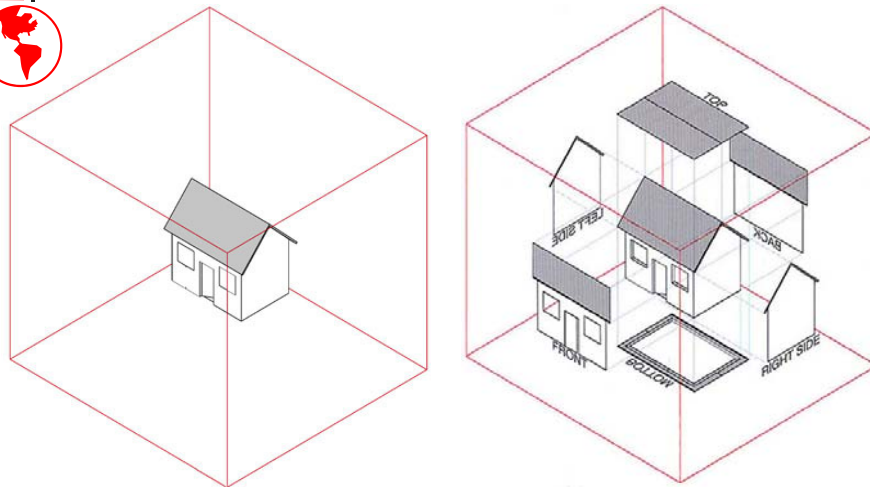


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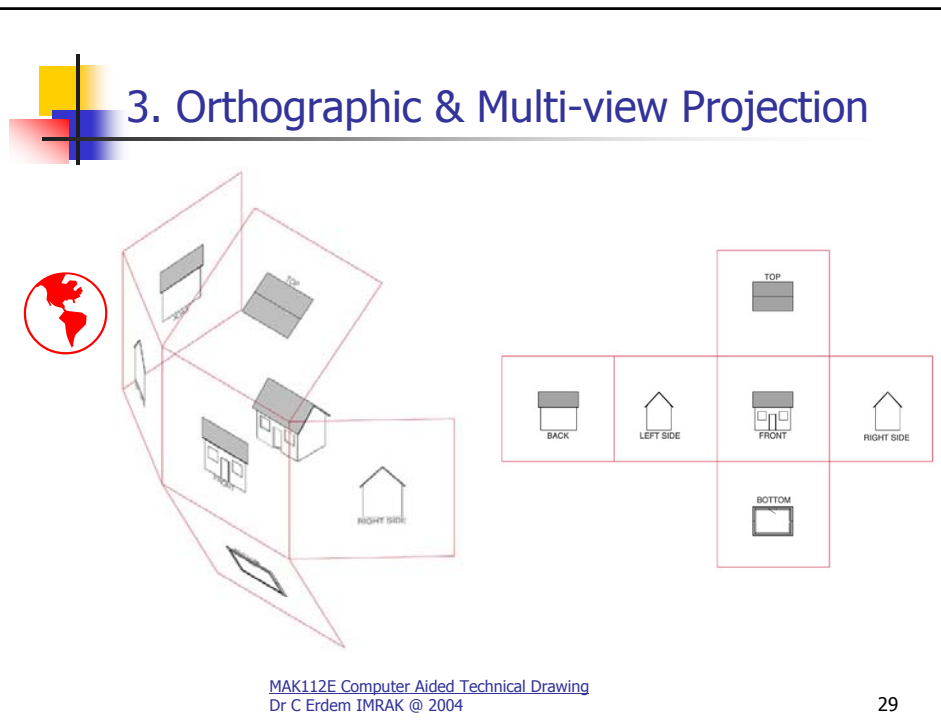


### 3. Orthographic & Multi-view Projection



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### 3. Orthographic & Multi-view Projection

#### Multi-view Drawing

- Multiview drawing is classified as a parallel projection technique, because the lines of sight used to view the object are parallel
- The standard means of multiview projection in engineering graphics is what we have referred to earlier as the *orthographic projection*.

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### 3. Orthographic & Multi-view Projection

#### Multi-view Drawing

- Enough views are generated to capture all the important features of the object.
- Orienting and selecting the front view when creating a multiview drawing of a design, the selection and orientation of the front view is an important first step.

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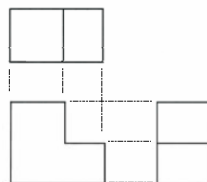
31



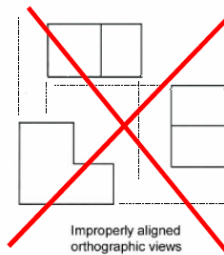
### 3. Orthographic & Multi-view Projection

#### Multi-view Drawing

Align views with each other (features project from one view to the next)



Properly aligned  
orthographic views



Improperly aligned  
orthographic views

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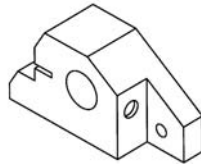
32



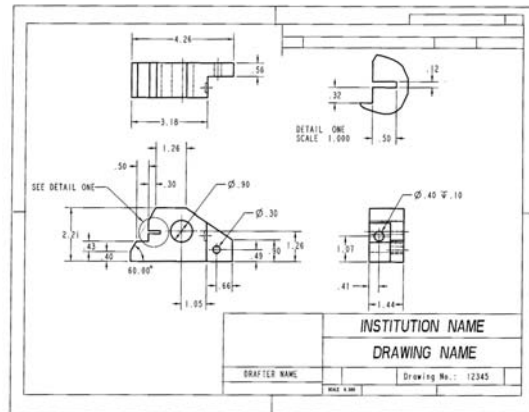


### 3. Orthographic & Multi-view Projection

#### Multi-view Drawing



3-D Model



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### 3. Orthographic & Multi-view Projection

#### Projection Views

The projection view is an orthographic projection from a general view or from an existing view.

Projection views become child views of the view from which they are projected.

Auxiliary Views

Detailed Views

Revolved Views

Half Views

Partial Views

Broken Views

Single-Surface Views

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### 3. Orthographic & Multi-view Projection

#### Sketching 2-D Geometry

##### Construction lines

Construction lines have been used throughout the history of drafting. As the name implies, these lines are used as aids for the purpose of constructing parts of a drawing. Construction lines are generally removed when the drawing is finished.

Making geometric constructions, such as bisecting angles or finding the center of a triangle.

Projecting features from one view to the next in an orthographic projection for multiview drawing in mechanical drafting.

Projecting between elevations in an architectural drawing.

Establishing the projection of a bearing wall or partition in an architectural or structural layout.

Creating temporary intersections for the use of object snaps.

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### 3. Orthographic & Multi-view Projection

#### Drawing Construction Lines between Two Points

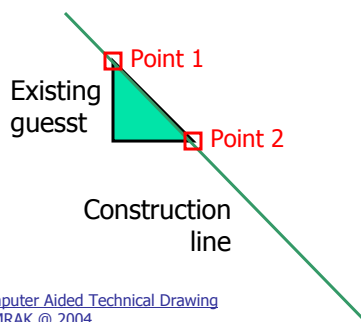
Command: XLINE

Specify a point or [Hor/Ver/Ang/Bisect/offset]: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point:

Command:



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### 3. Orthographic & Multi-view Projection

#### **Drawing Construction Lines between Two Points**

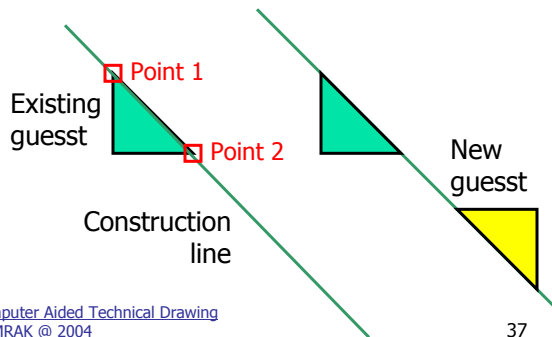
Command: XLINE

Specify a point or [HorNer/Ang/Bisectloffset]: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point:

Command:



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### 3. Orthographic & Multi-view Projection

#### **Drawing Horizontal and Vertical Construction Lines**

Command: XLINE

Specify a point or [HorNer/Ang/Bisectloffset]: **V**

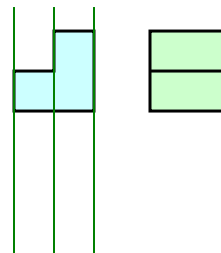
Specify through point: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point: *<pick point 3>*

Specify through point:

Command:



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### 3. Orthographic & Multi-view Projection

#### **Drawing Horizontal and Vertical Construction Lines**



Command: **XLINE**

Specify a point or [HorNer/Ang/Bisectloffset]: **V**

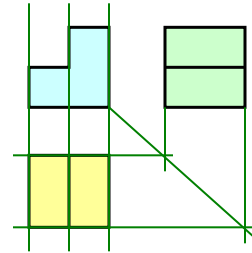
Specify through point: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point: *<pick point 3>*

Specify through point:

Command:



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### Görünüşlerin Çizilmesi

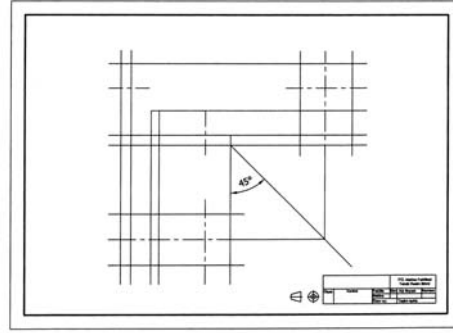
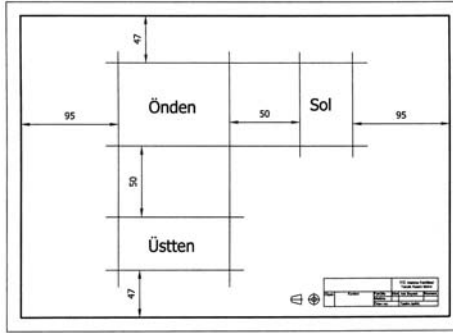
- Görünüşler, cisim üzerinde izdüşüm düzlemine düşürülen ışınların yerlerine göre adlandırılır.
- **Önden görünüş** : Cisme karşıdan bakılarak çizilen görünüşe denir. Bu görünüş cismin esas görünüşü olup, resim kağıdına genellikle ilk önce çizilir.
- **Üstten görünüş** : Cisme üstten bakılarak çizilen görünüşe denir ve önden görünüşün altına çizilir.
- **Sol yan görünüş** : Sol yandan bakılarak çizilen görünüşe denir ve önden görünüşün sağ tarafına çizilir. Diğer görünüşler de izdüşüm yöntemine uygun olarak adlandırılarak belirtilen yerlere çizilir.

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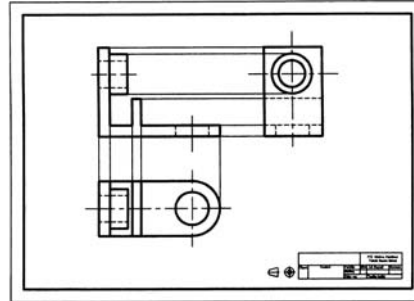
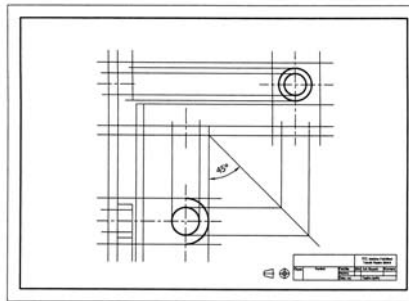
## Perspektif Resimden Görünüşlerin Çizilmesi

1. Önden görünüş seçilmeli ve izdüşüm yöntemine göre diğer görünüşler ve yerleri kağıt üzerinde işaretlenmeli
2. İnce taşıma çizgileri yardımıyla çizim kağıdı üzerinde görünüşler izdüşüm yardımıyla çizilmeli



## Perspektif Resimden Görünüşlerin Çizilmesi

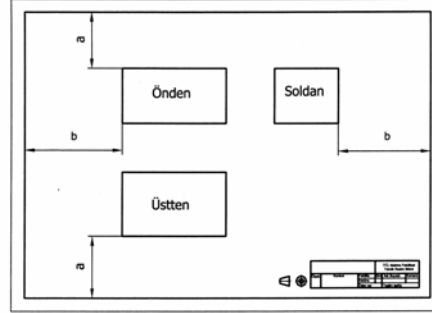
1. Çember ve yaylar A tipi çizgi ile belginleştirilmeli ve görünmeyen çizgiler ile diğer çizgiler çizilmeli
2. Üç görünüşün çizimi tamamlandıktan sonra taşıma çizgileri temizlenmeli ve ölçülendirme işlemiyle çizim tamamlanmalıdır





## Görünüşlerin Çizilmesi

- Görünüşler aynı hizada, yani (sağ yan, ön, sol yan ve arka görünüşler) paralel ve yatay iki çizgi içinde; (alt, ön, üst görünüşler) düşey iki çizgi içinde kalacak şekilde, çizilme zorunluluğu vardır.
- Görünüşlerin birbirlerinden faydalanılarak diğerinin kolaylıkla çizilmesini ve ölçülendirilmesini sağlar.

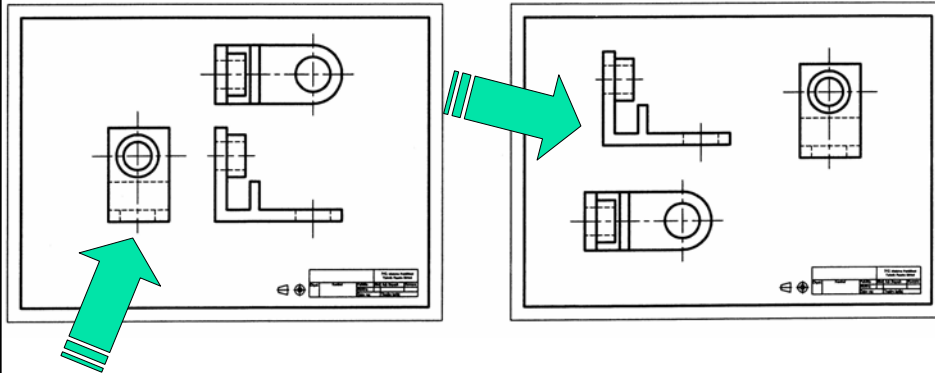


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## Görünüşlerin Hatalı Çizilmesi



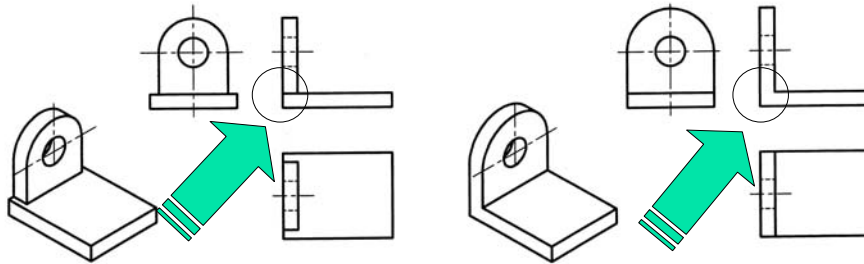
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## Görünüşlerin Hatalı Çizilmesi

Görünüşlerin çizilmesinde parçanın birleşme yerlerine dikkat edilmelidir.



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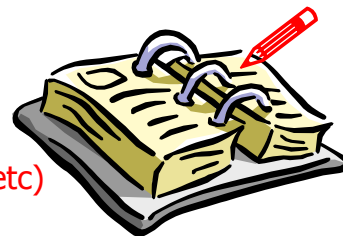
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## 3. Orthographic & Multi-view Projection

### Assignment Procedure

- Open ISO\_A3 template file
- Format the drawing file (linetype etc)
- Sketch the front view
- Complete the top view and the side view
- Fill in the title block (name, number, date etc)
- Save your file (i.e. XXXXX.dwg)



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