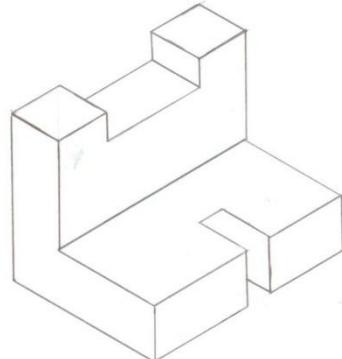


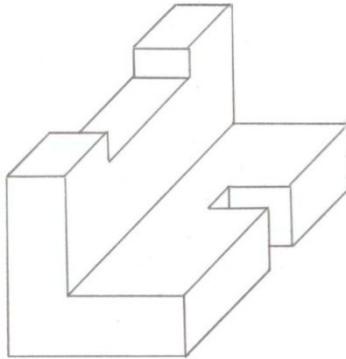
# Isometric and Oblique Projections

# Pictorial Drawing

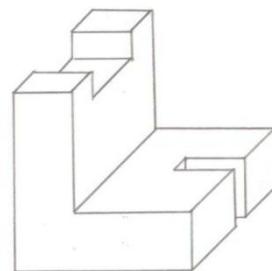
- 2D illustration of a 3D object
- Shows three faces of an object in one view
- Provides a realistic view of an object
- Three types
  - Isometric
  - Oblique
  - Perspective



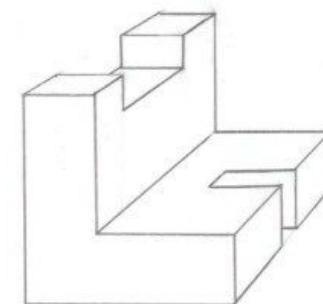
Isometric



Oblique (Cavalier)



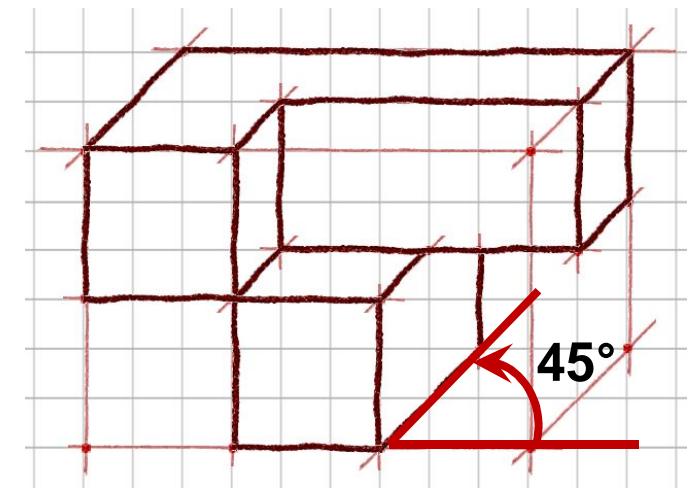
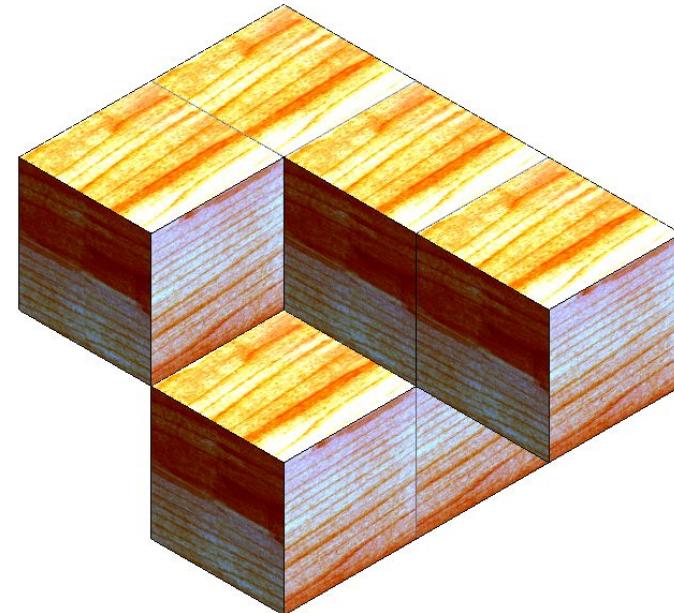
Oblique (Cabinet)



Perspective

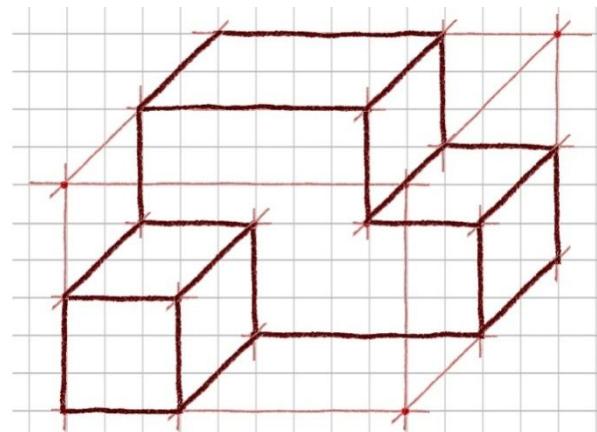
# Oblique Pictorials

- An *Oblique pictorial* starts with a straight-on view of one of the object's faces, which is often the front face
- Angled, parallel lines are drawn to one side to represent the object's depth. Common oblique angles include  $30^\circ$ ,  $45^\circ$ , and  $60^\circ$

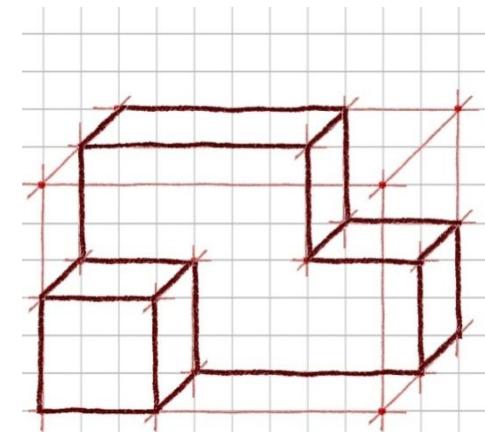


# Oblique Pictorials

- Two common types of *oblique pictorials*:
  - Cavalier
  - Cabinet
- The difference between the two is how the *depth* of the object is represented



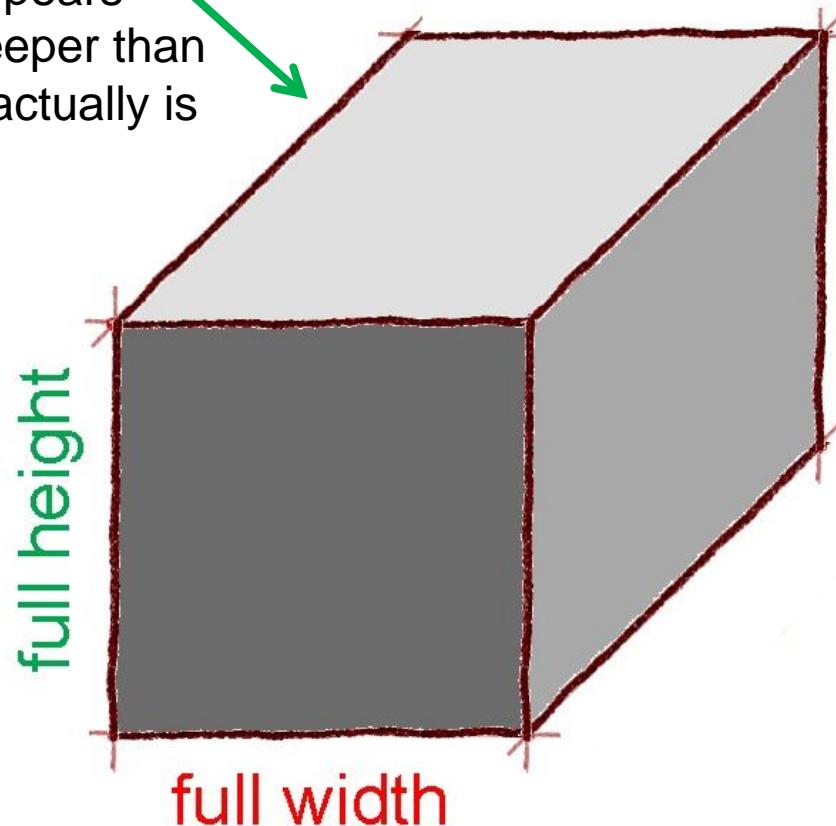
**Cavalier Oblique**



**Cabinet Oblique**

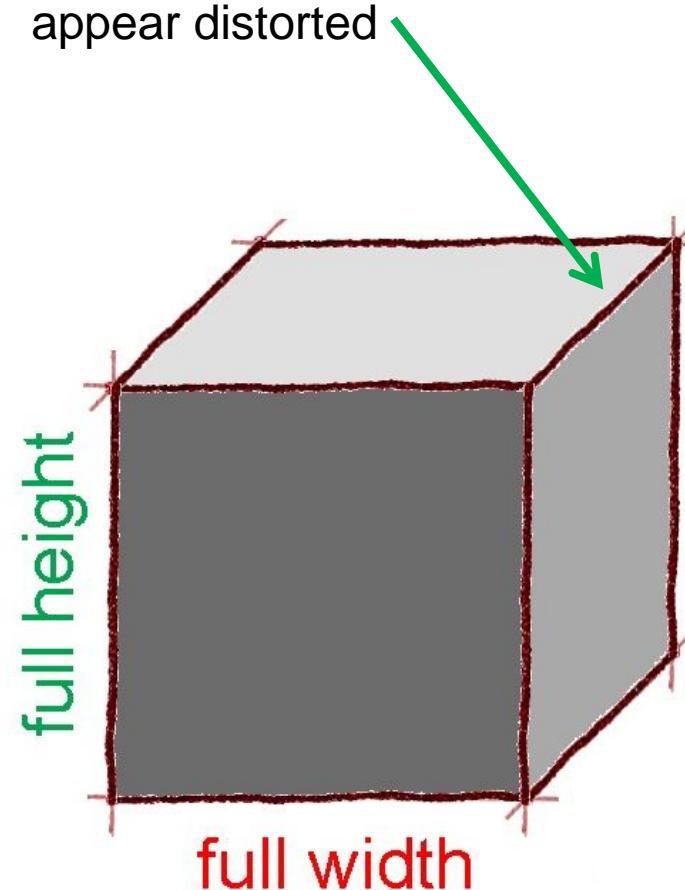
# Oblique Pictorials

Object appears deeper than it actually is



**Cavalier Oblique**

More realistic view because depth does not appear distorted

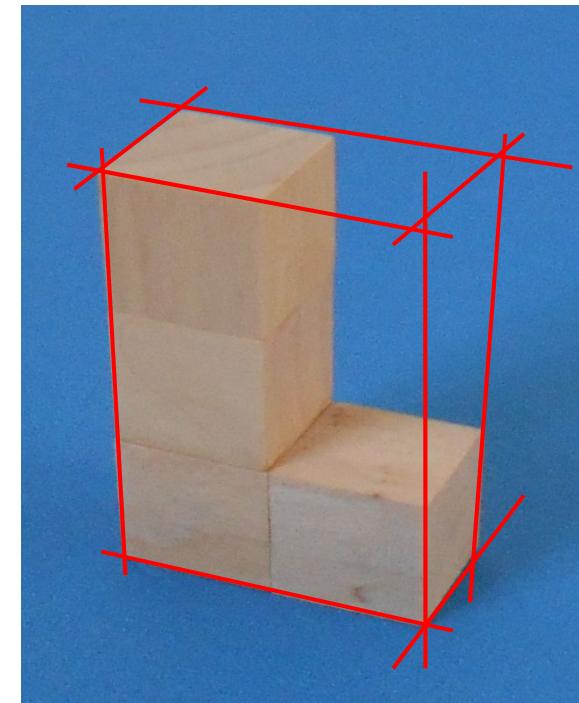


**Cabinet Oblique**

# Oblique Pictorials

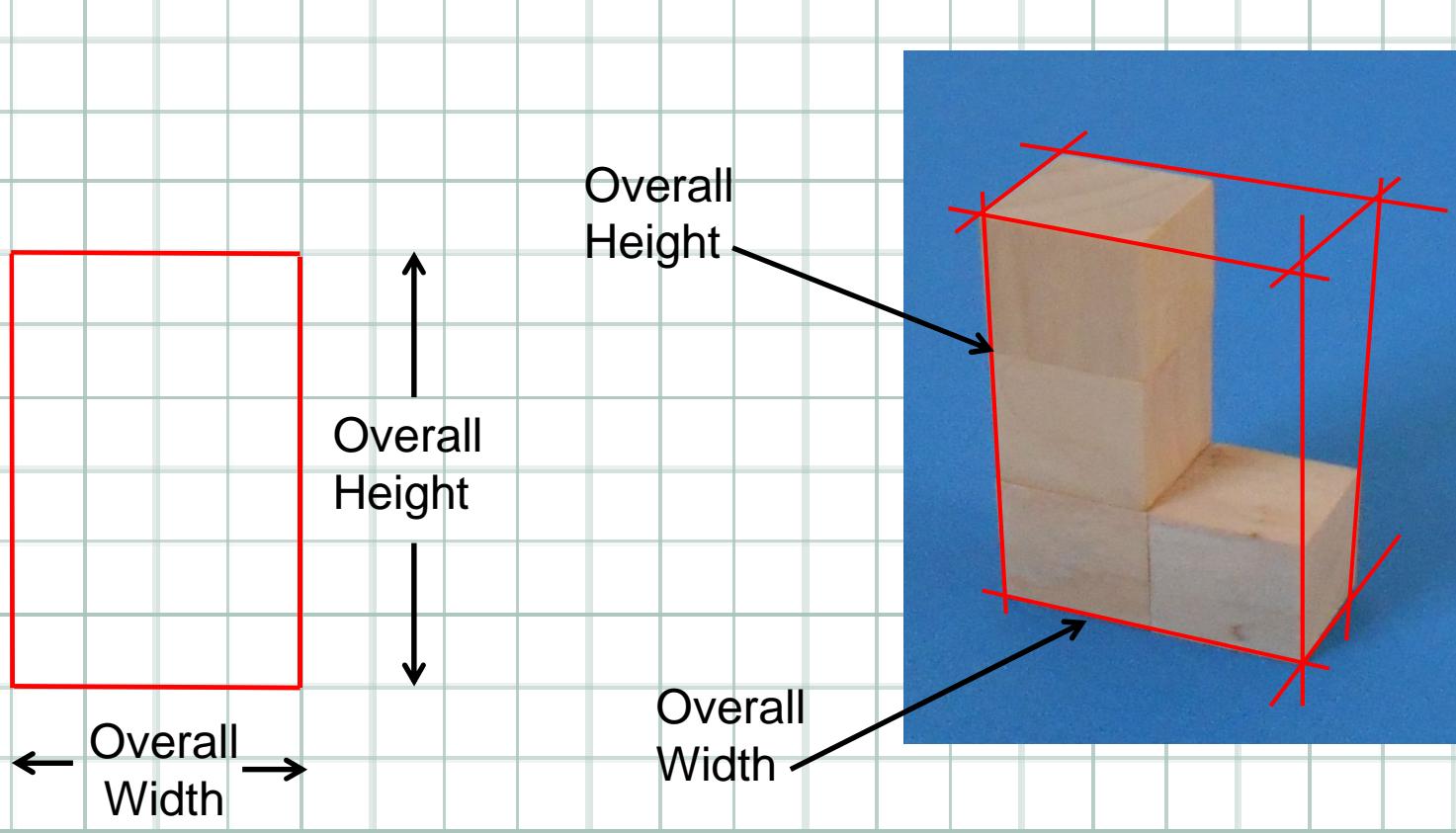
The following slides show the steps in creating oblique pictorials of the puzzle piece shown below.

Imagine a glass box that encloses the entire object.



# Oblique Pictorials

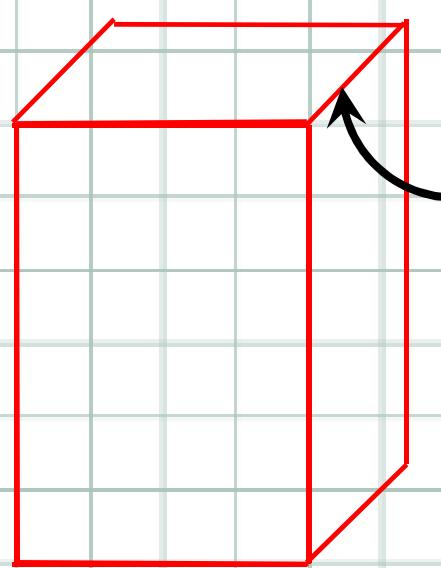
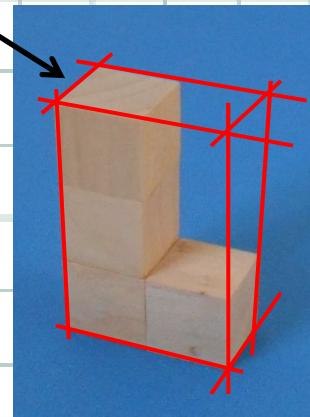
1. Sketch a rectangle to represent the overall height and width of “the box” such that height lines are vertical and widths lines are horizontal. This will give a straight on view of the front of the object.



# Oblique Pictorials

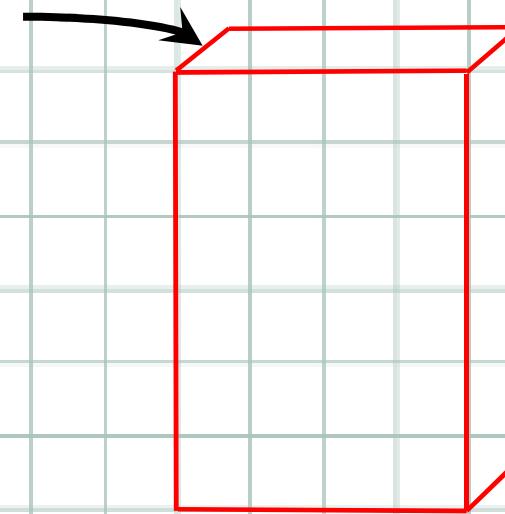
2. Complete “the box” by sketching depth lines to the overall depth of the object at a given angle (45 degrees here).

Overall Depth



**Cavalier Oblique**

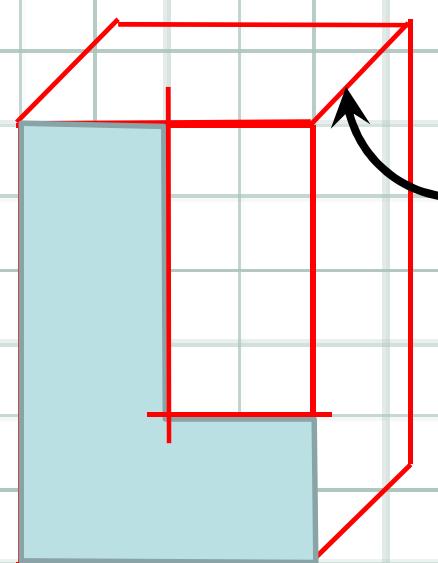
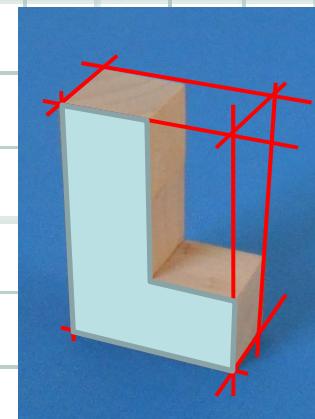
Cabinet is drawn half depth



**Cabinet Oblique**

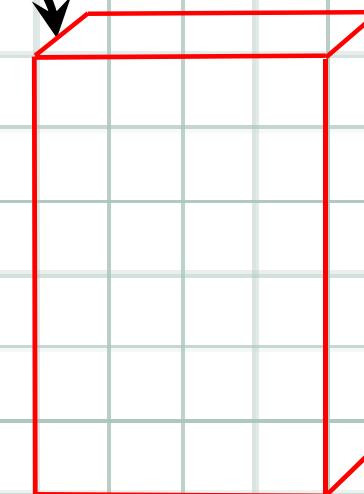
# Oblique Pictorials

- Sketch points and construction lines to identify the edges of the object faces that occur on the visible surfaces of “the box”.



Cabinet is half depth

Cavalier is full depth

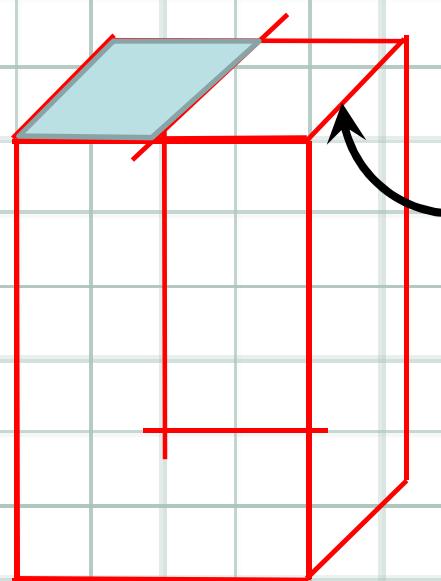
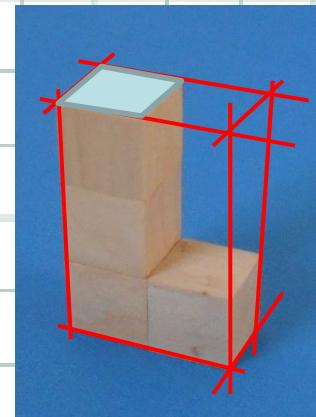


**Cavalier Oblique**

**Cabinet Oblique**

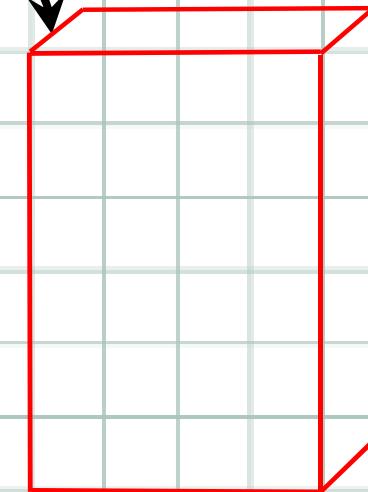
# Oblique Pictorials

- Sketch points and construction lines to identify the edges of the object faces that occur on the visible surfaces of “the box”.



Cabinet is half depth

Cavalier is full depth

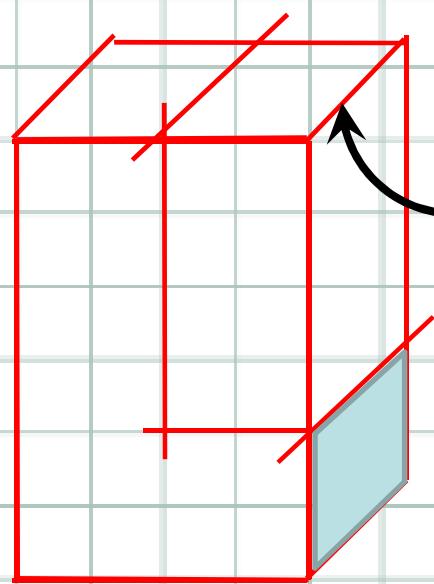
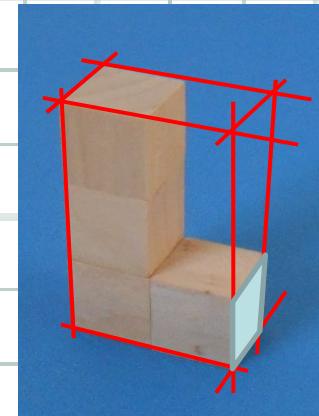


**Cavalier Oblique**

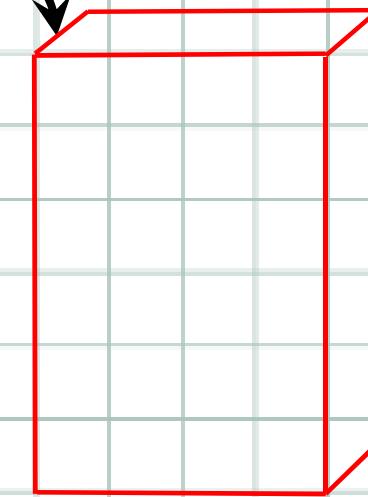
**Cabinet Oblique**

# Oblique Pictorials

3. Sketch points and construction lines to identify the edges of the object faces that occur on the visible surfaces of “the box”.



Cabinet is half depth  
Cavalier is full depth

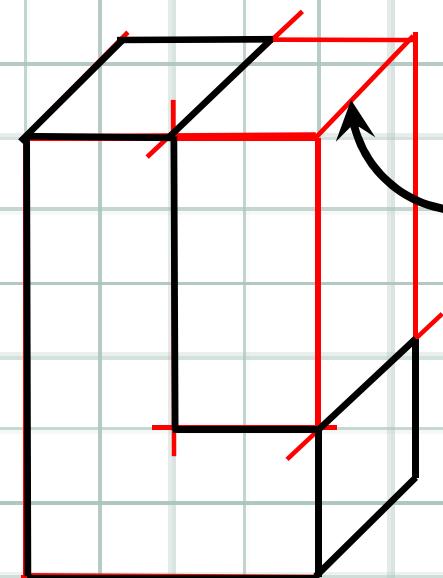
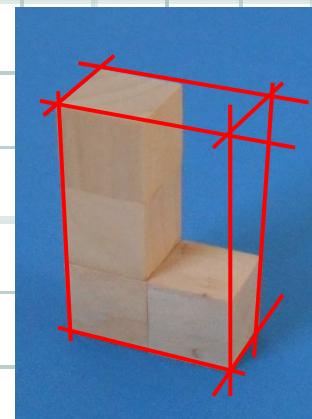


**Cavalier Oblique**

**Cabinet Oblique**

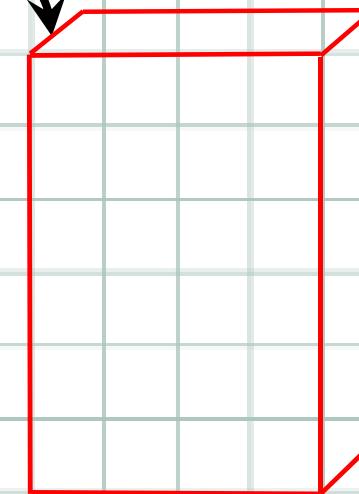
# Oblique Pictorials

4. Use object lines to trace over the construction lines to delineate the edges of the object faces that occur on the visible surfaces of “the box”.



Cabinet is half depth

Cavalier is full depth

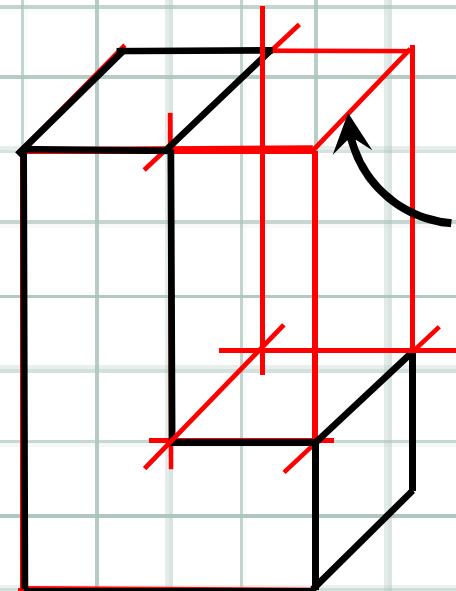


**Cavalier Oblique**

**Cabinet Oblique**

# Oblique Pictorials

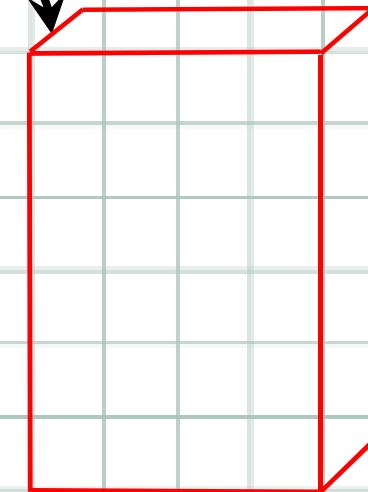
5. Sketch additional construction lines to identify edges of the object inside of the box.



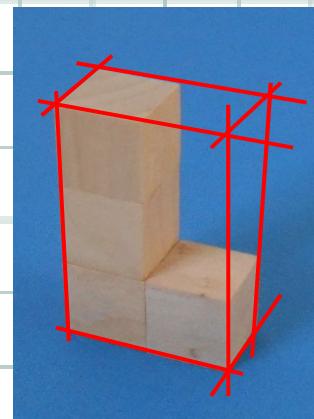
**Cavalier Oblique**

Cabinet is  
half depth

Cavalier is  
full depth

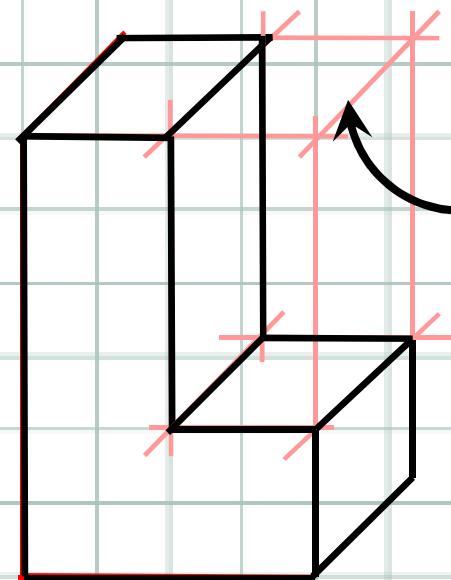


**Cabinet Oblique**



# Oblique Pictorials

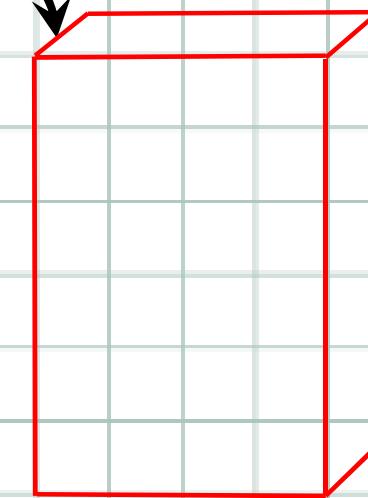
6. Trace over construction lines with object lines to delineate the remaining object lines.



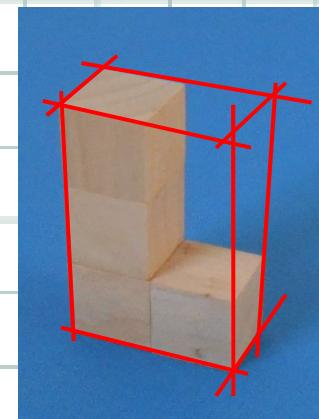
**Cavalier Oblique**

Cabinet is  
half depth

Cavalier is  
full depth

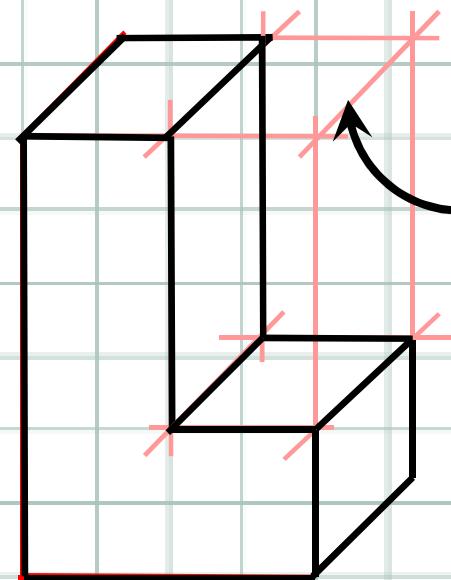


**Cabinet Oblique**



# Oblique Pictorials

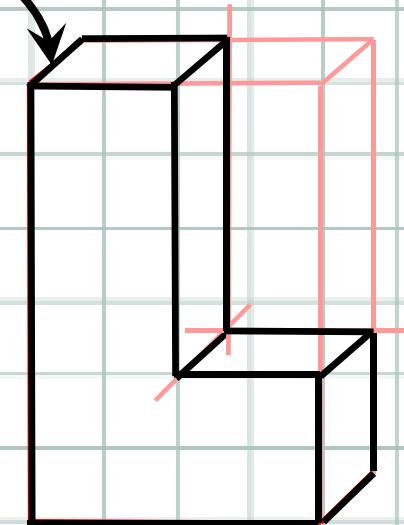
Create the Oblique Cabinet view.



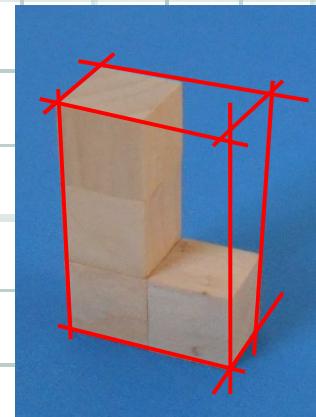
**Cavalier Oblique**

Cabinet is  
half depth

Cavalier is  
full depth

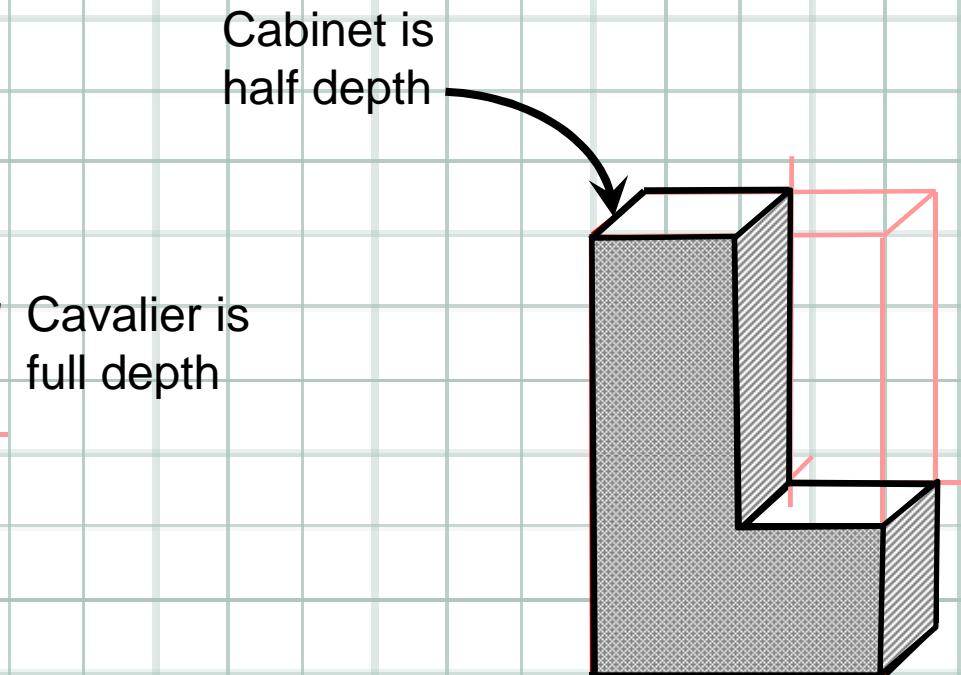
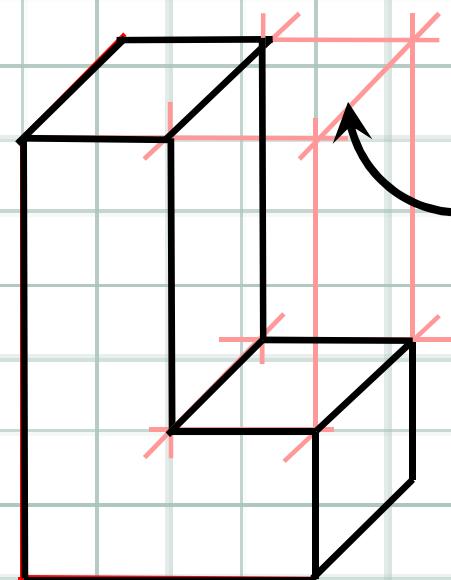
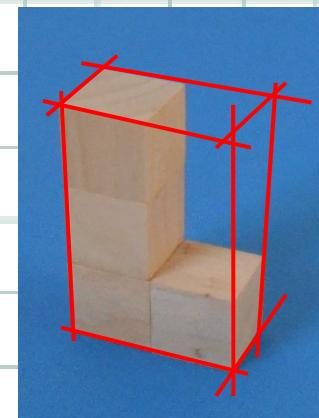


**Cabinet Oblique**



# Oblique Pictorials

7. You may use tonal shading to enhance the appearance of the perspective sketch and create a more realistic representation.



Cabinet is half depth

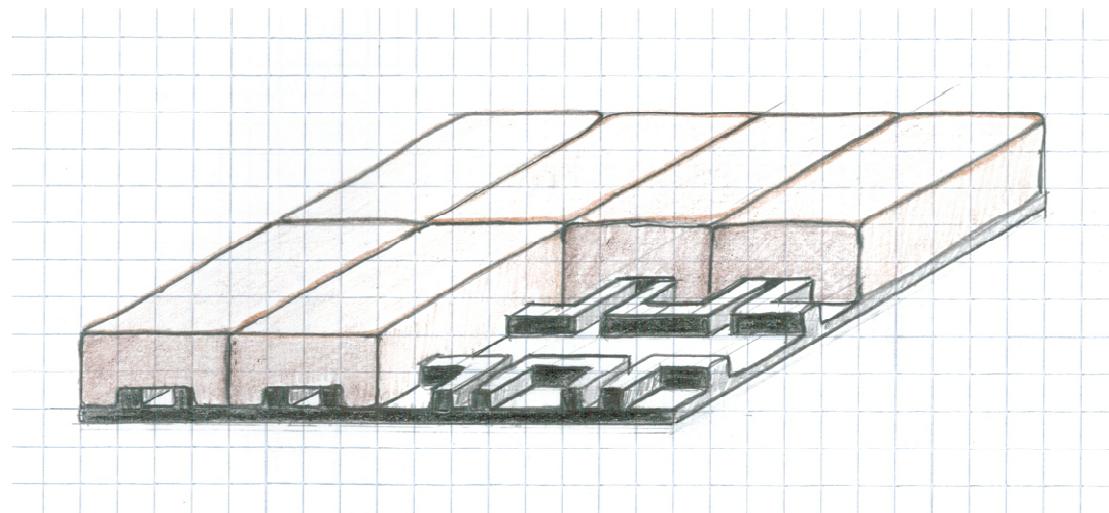
Cavalier is full depth

**Cavalier Oblique**

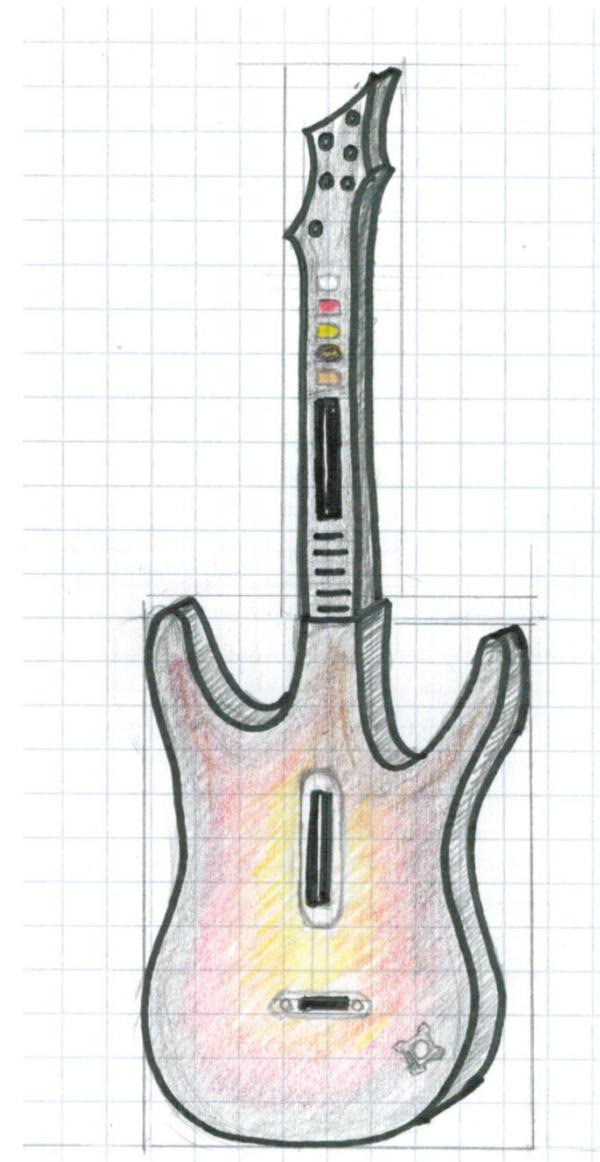
**Cabinet Oblique**

# Oblique Pictorials

- Examples



Interlocking pavement concept

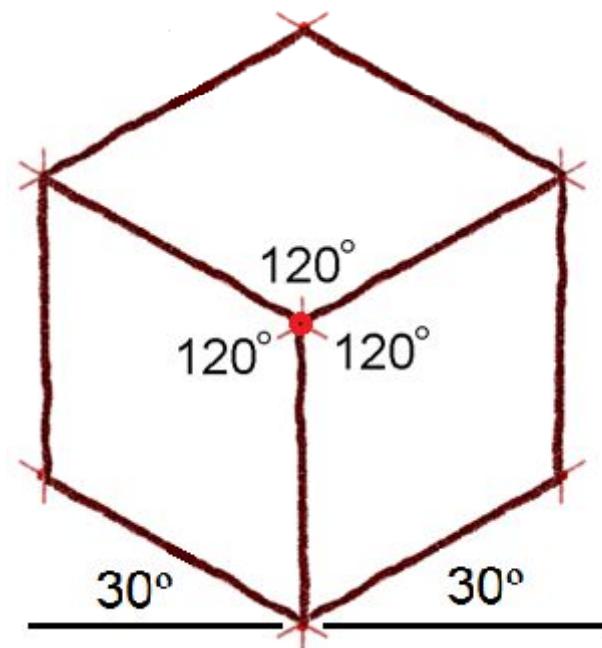


Game system  
controller

# Isometric Pictorial

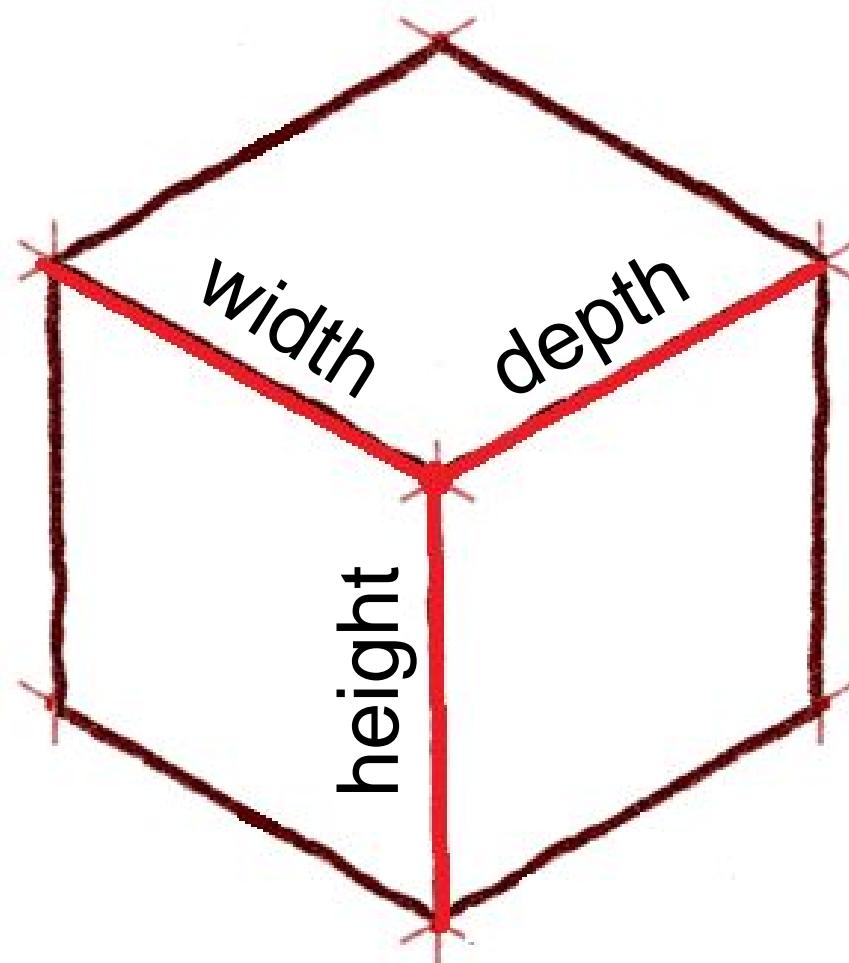
*Isometric* means *equal measure*.

- Three adjacent faces on a cube will share a single point
- Edges converge at one point will appear as 120 degree angles or 30 degrees from the horizon line

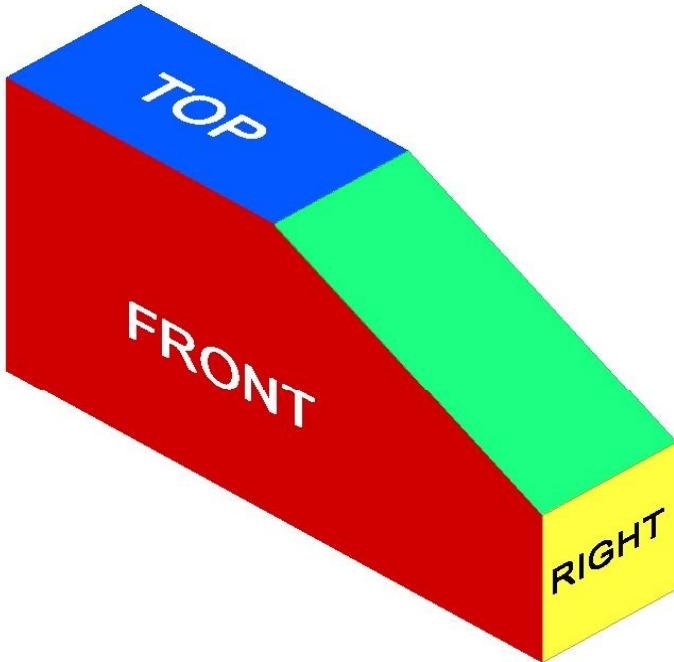


# Isometric Pictorial

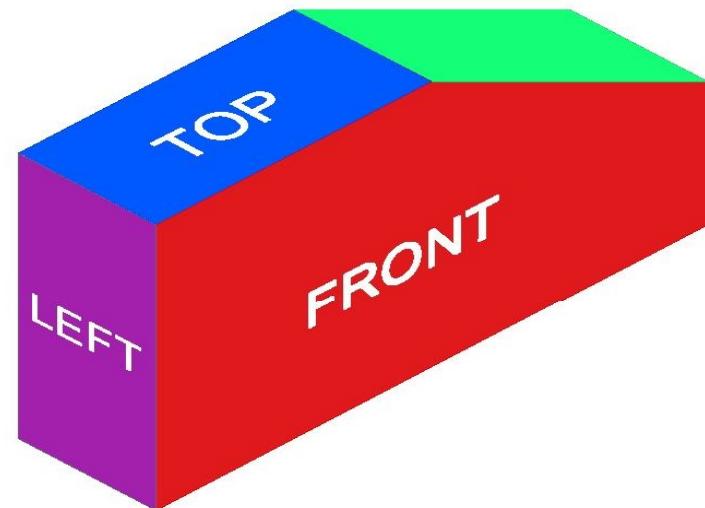
- These three edges represent height, width, and depth



# View labels



Top, Front, Right Side  
view orientation

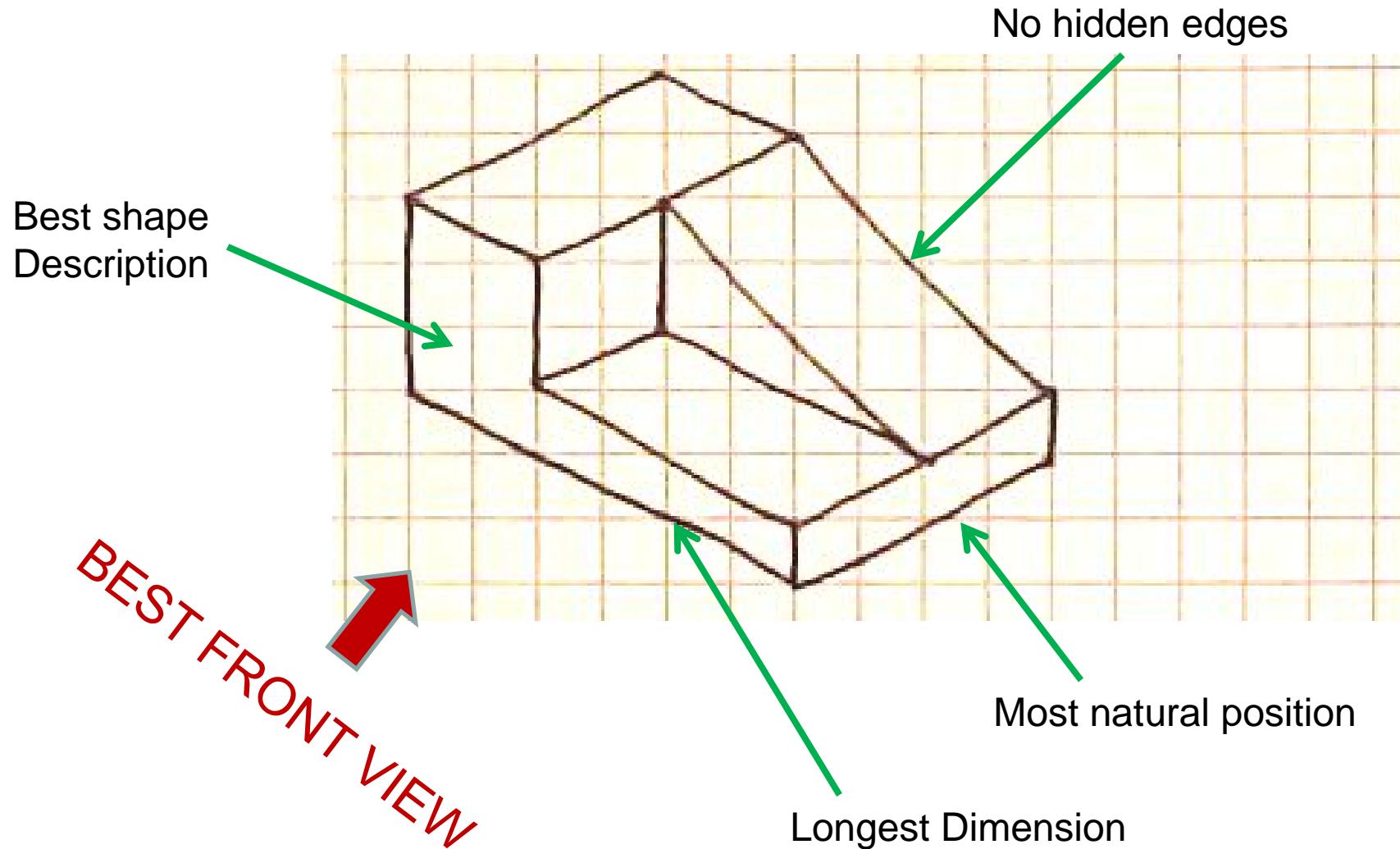


Top, Left Side, Front,  
view orientation

# View Selection

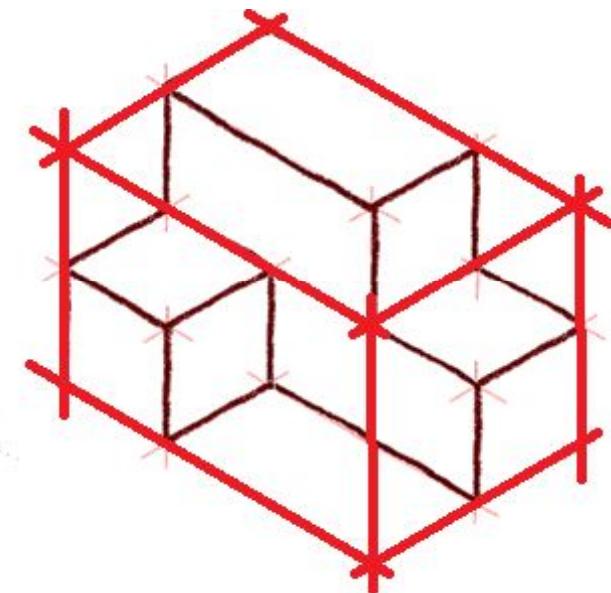
- Recommendations for how to select the front view
  - Most natural position or use
  - Shows best shape and characteristic contours
  - Longest dimensions
  - Fewest hidden lines
  - Most stable and natural position

# Orthographic View Selection



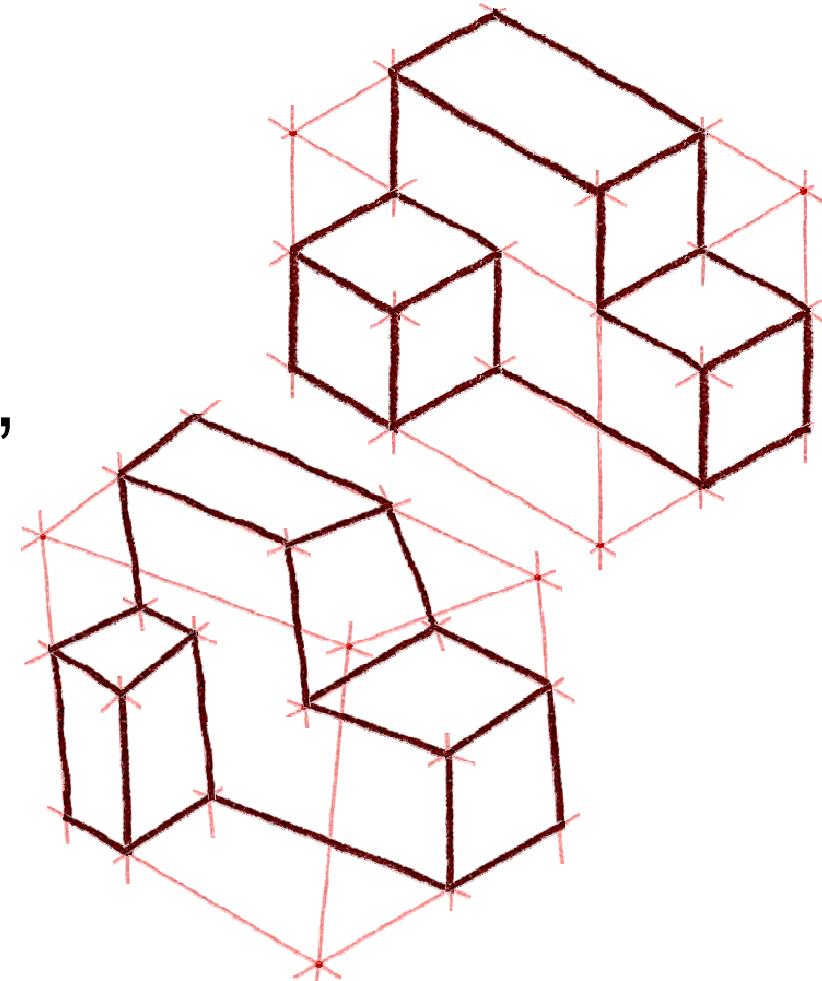
# The Box Method

- The box method is a sketching technique used to maintain proportionality
- It starts with a sketcher envisioning an object contained within an imaginary box



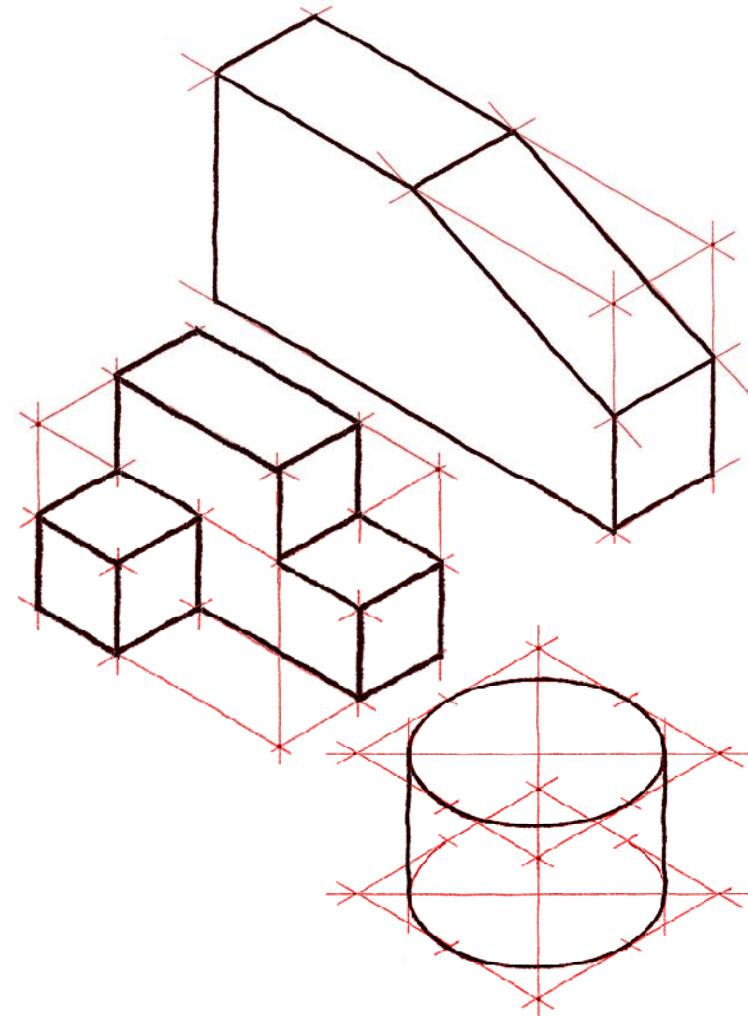
# Proportion and Estimation

- Good sketching requires a sense of proportion, and the ability to estimate size, distance, angles, and other spatial relationships



# Isometric Sketching

- The following examples show steps used to create isometric sketches of simple geometric objects, including tonal shading techniques

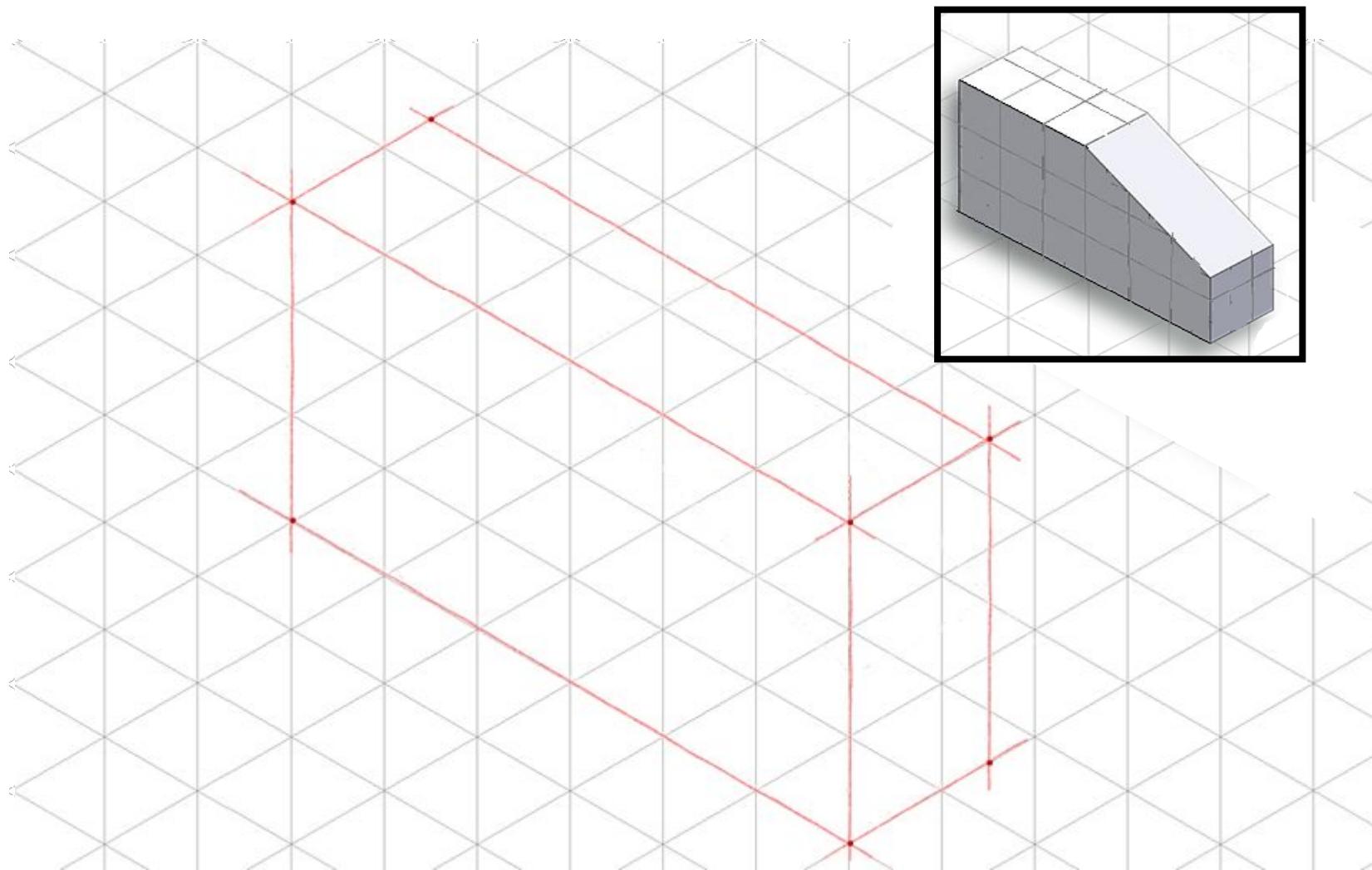


# EXAMPLE 1

## Isometric Sketch

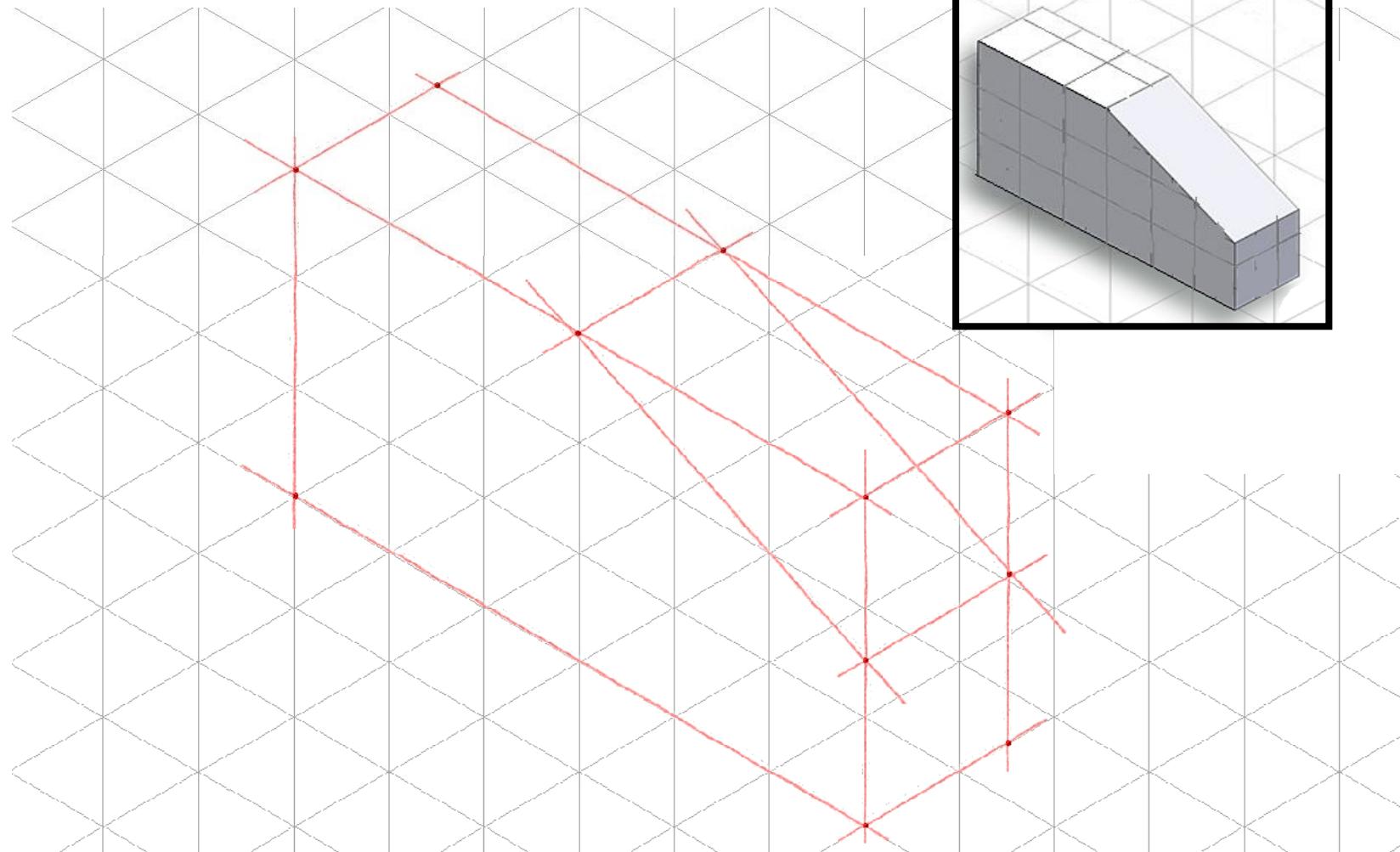
# Step 1: Construct the Box

Layout the box that will contain the isometric view using points and construction lines



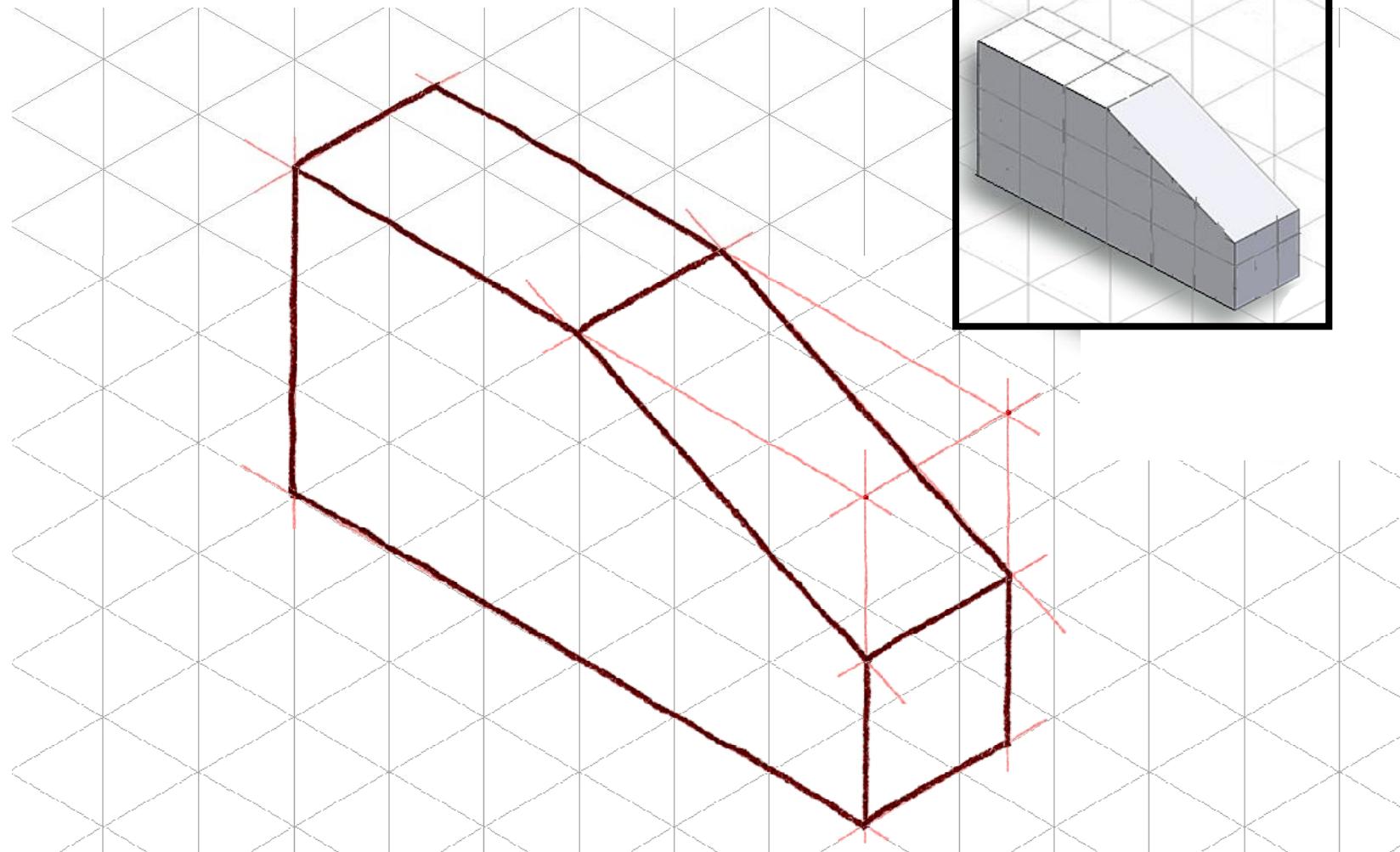
## Step 2: Outside Faces

Use points and construction lines to identify corners and edges of object faces that occur on box surface



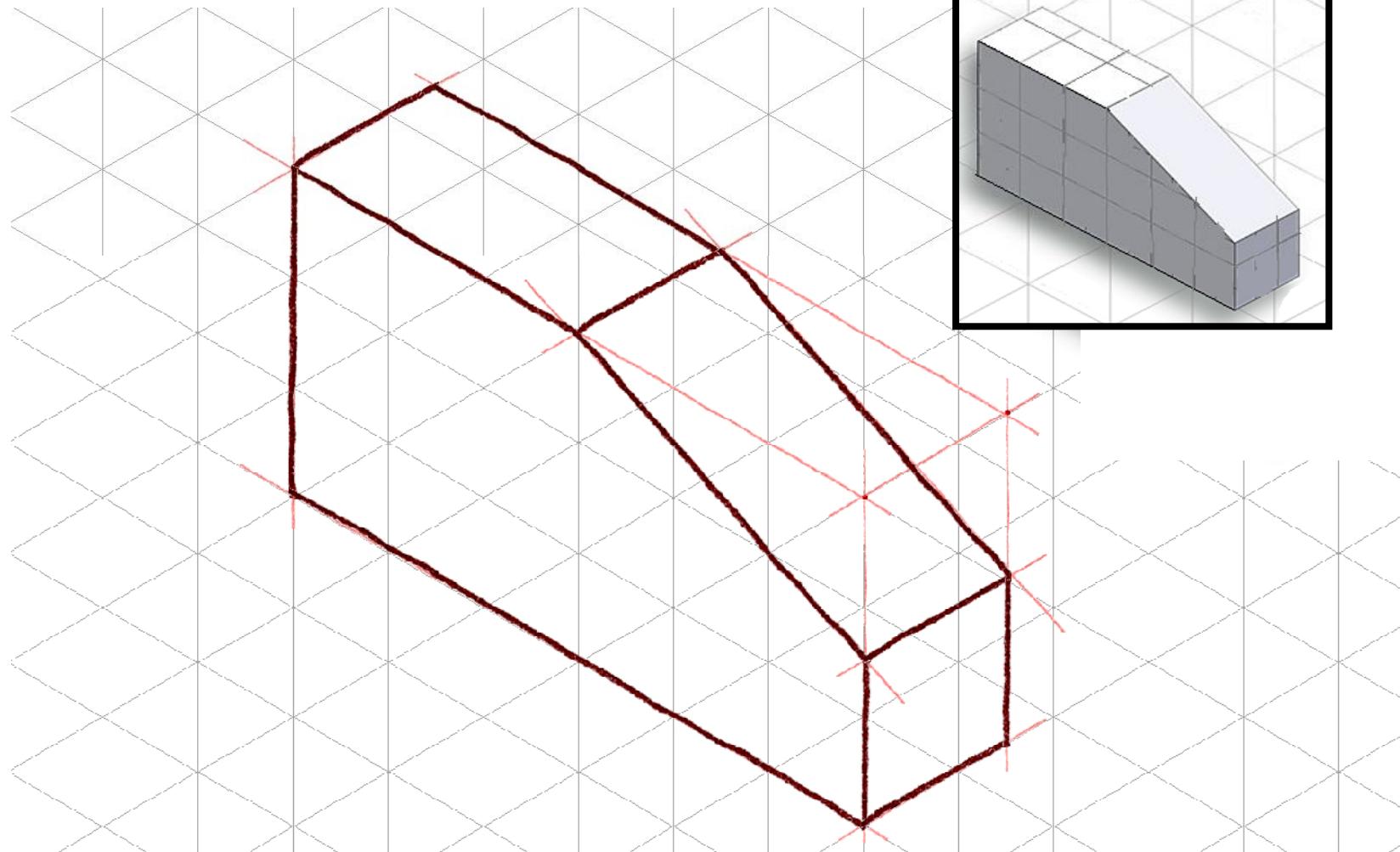
## Step 2: Outside Faces (continued)

Trace visible edges of part with thick, dark object lines



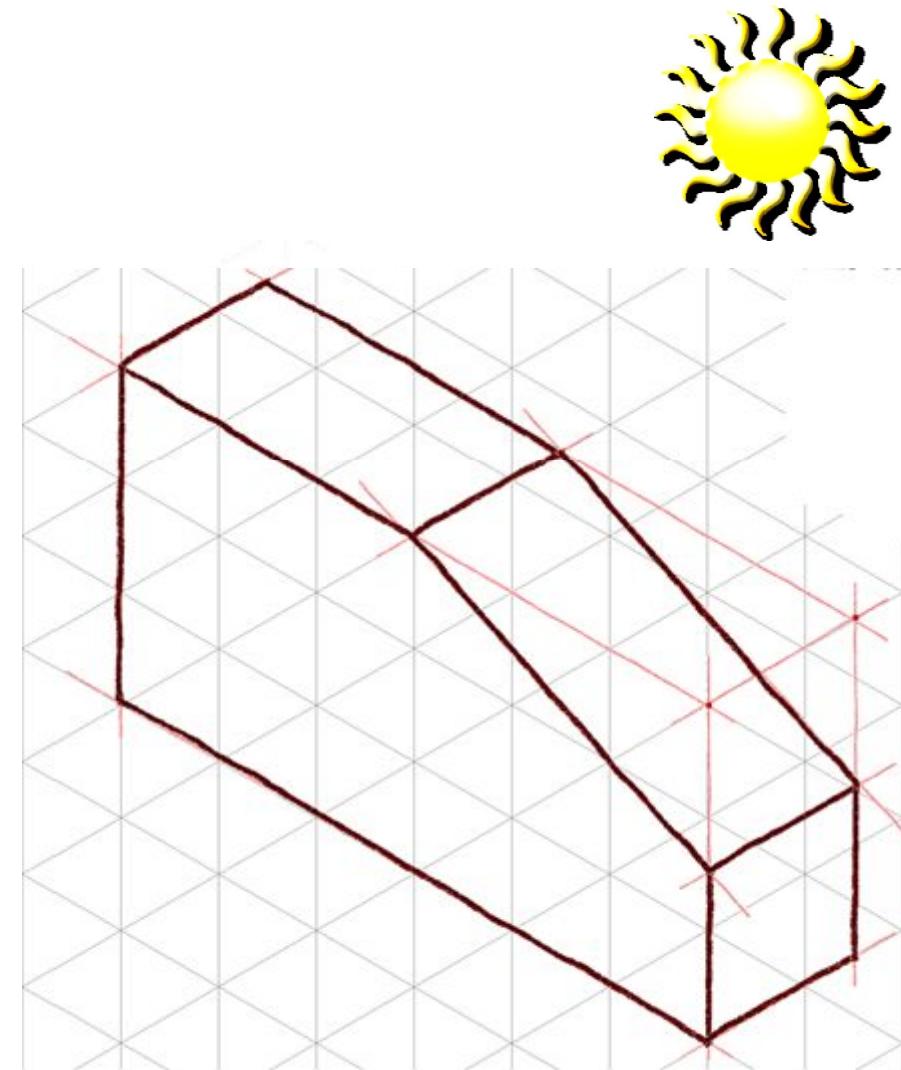
## Step 3: Inside Faces

In this case, there are no inside faces



## Step 4 - Tonal Shading

- Decide the light source position, and add tonal shading to two of the three faces
- A shading option is to use parallel lines drawn closely together on a face
- Increase contrast by cross-hatching lines on darkest face



## EXAMPLE 2

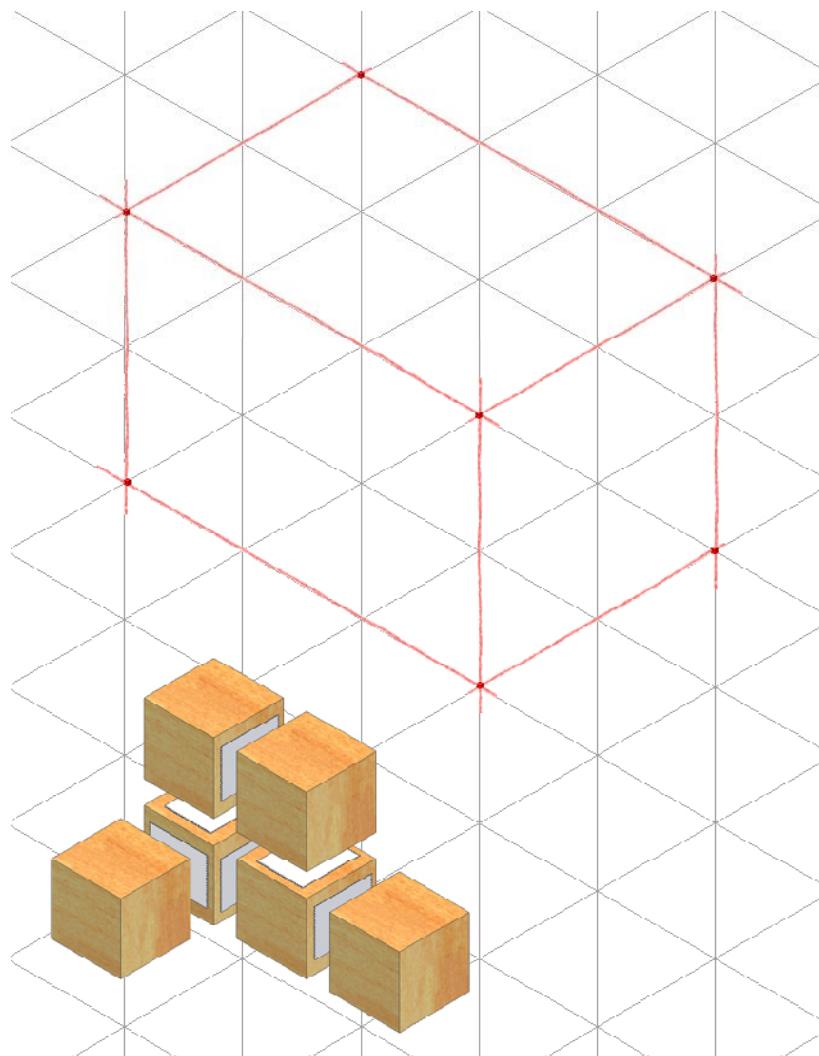
# Isometric Sketch

# Step 1: Constructing The Box

Determine the overall dimensions of the object:

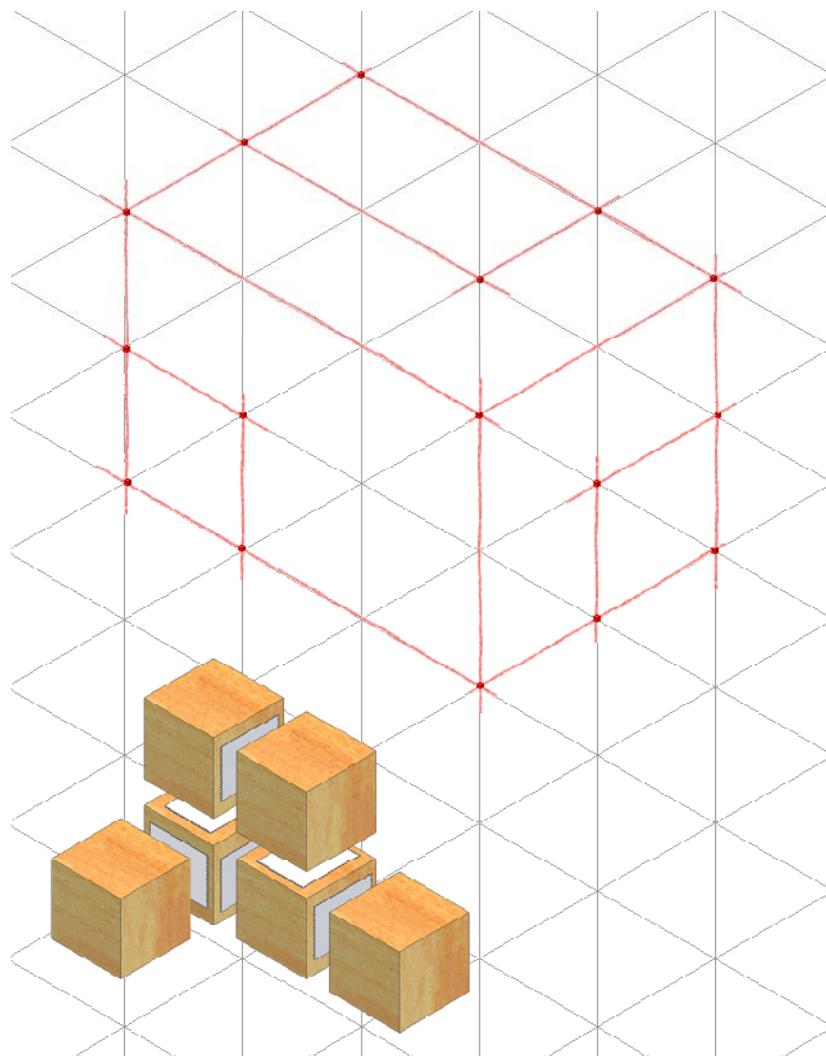
- 3 units wide
- 2 units tall
- 2 units deep

Use points and construction lines to layout the box.



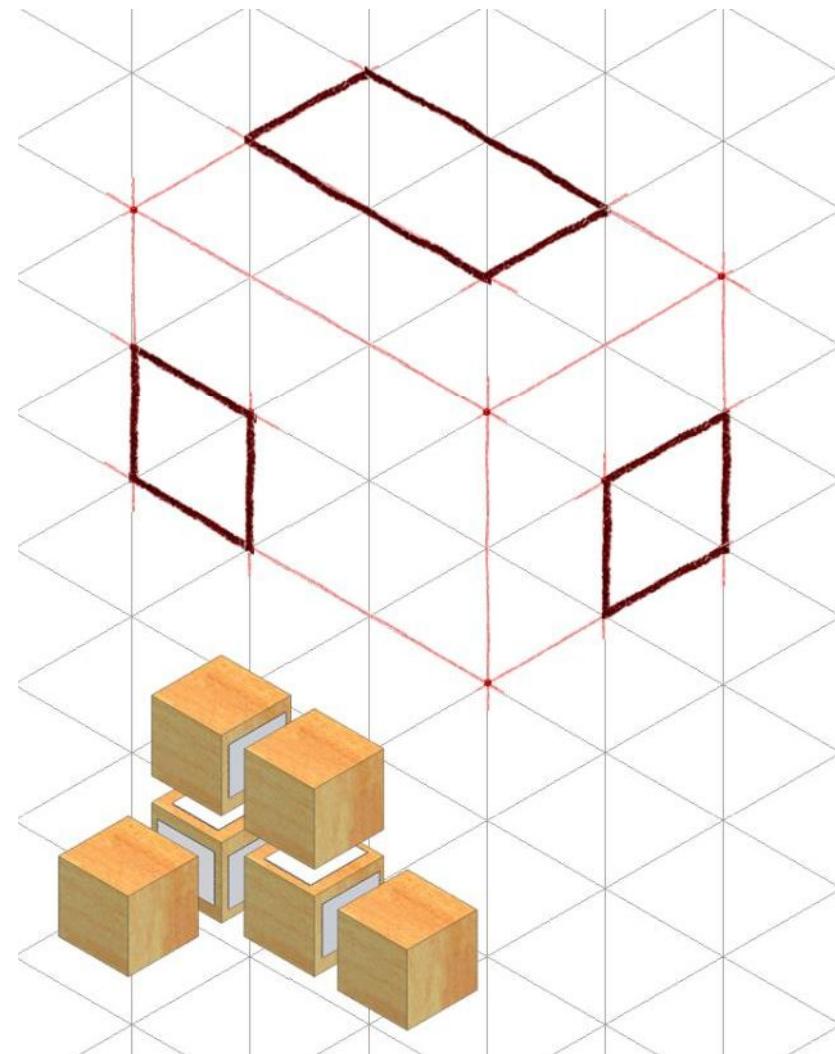
## Step 2: Outside Faces

Use points and construction lines to identify corners and edges of object faces that occur on surface of the box



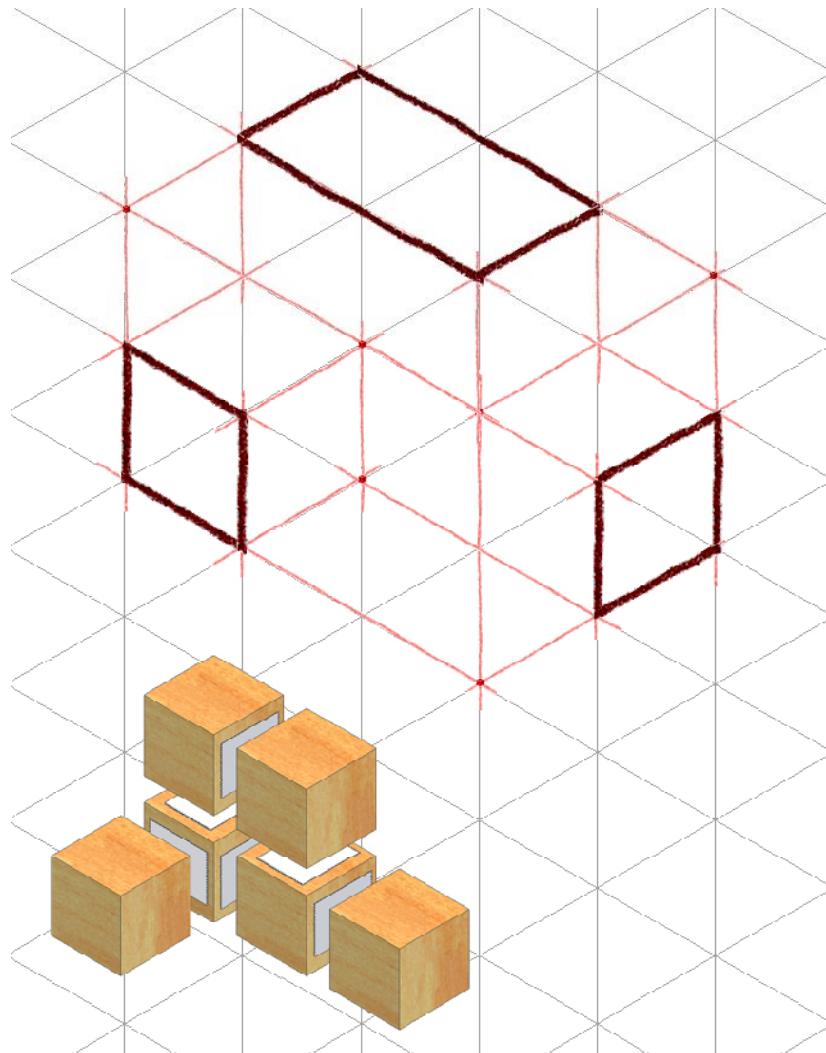
## Step 2 – Outside Faces (continued)

Before sketch becomes too congested with construction lines, trace visible edges with object lines



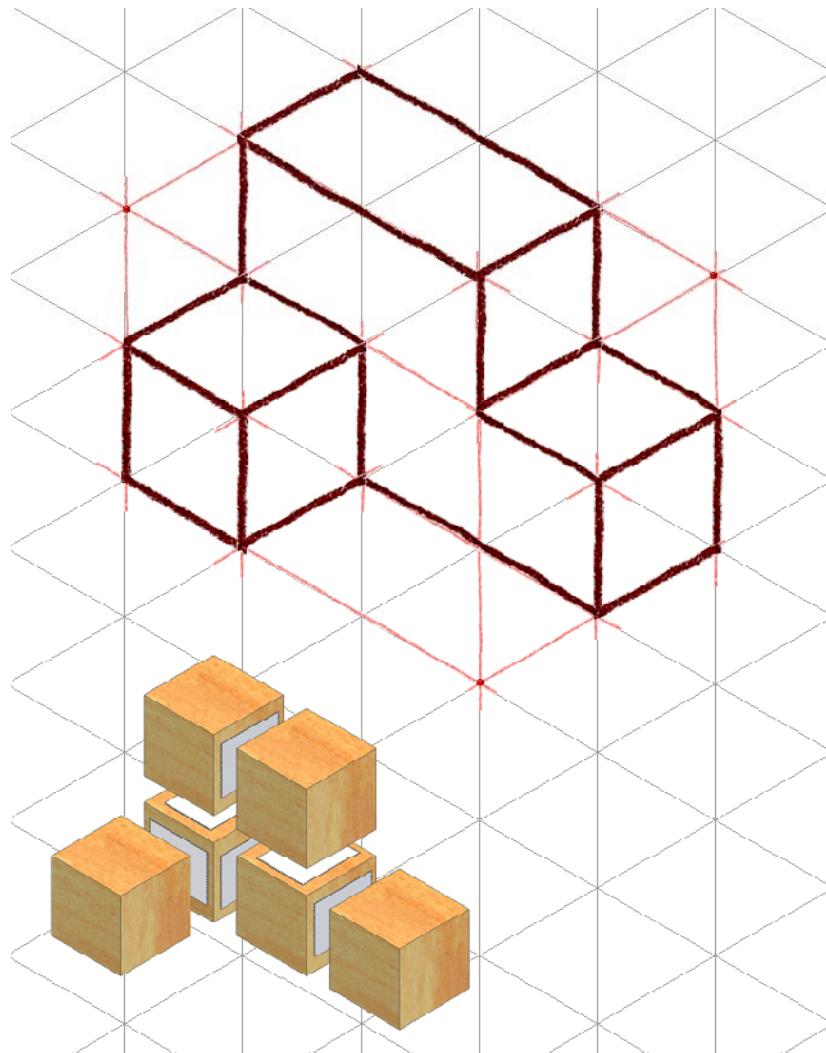
## Step 3 - Inside Faces

Use points and construction lines to identify the corners and edges of the object faces that occur inside the box.



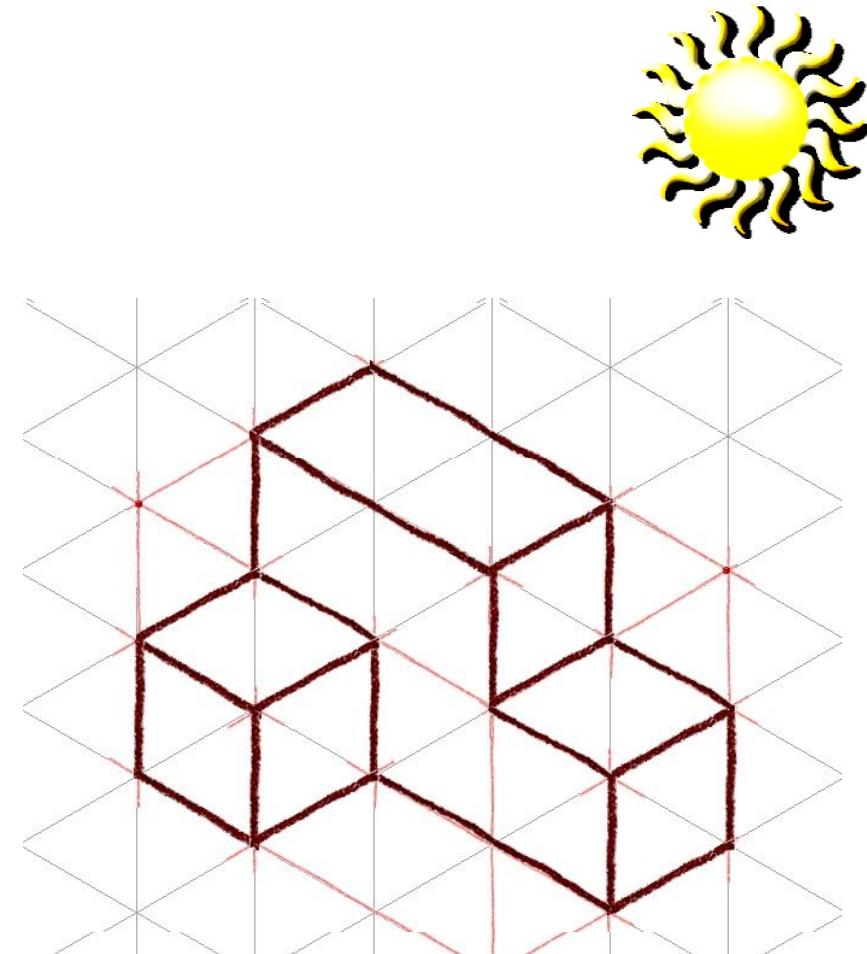
## Step 3 - Inside Faces (continued)

Trace out remaining  
visible edges with  
object lines

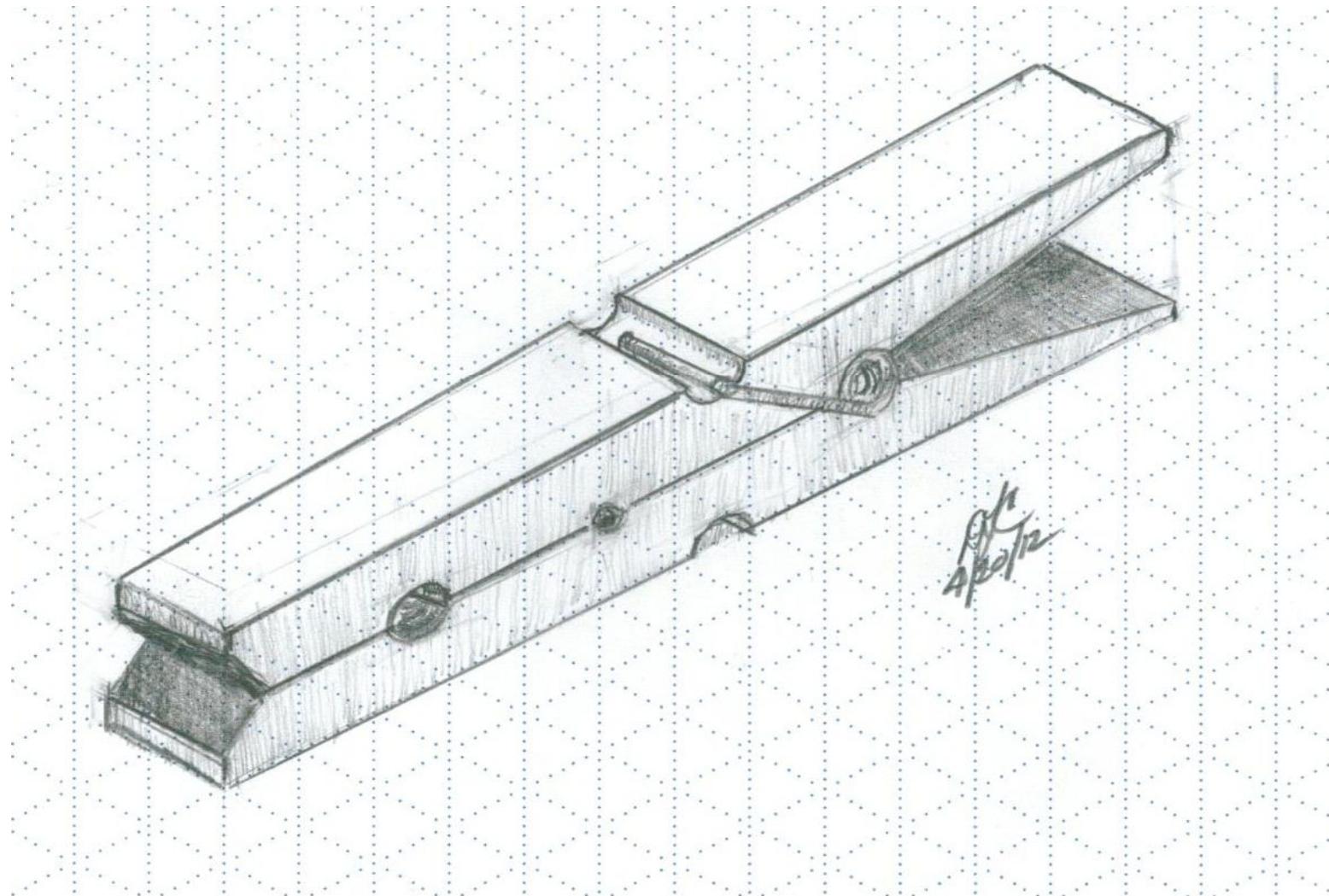


## Step 4 - Tonal Shading

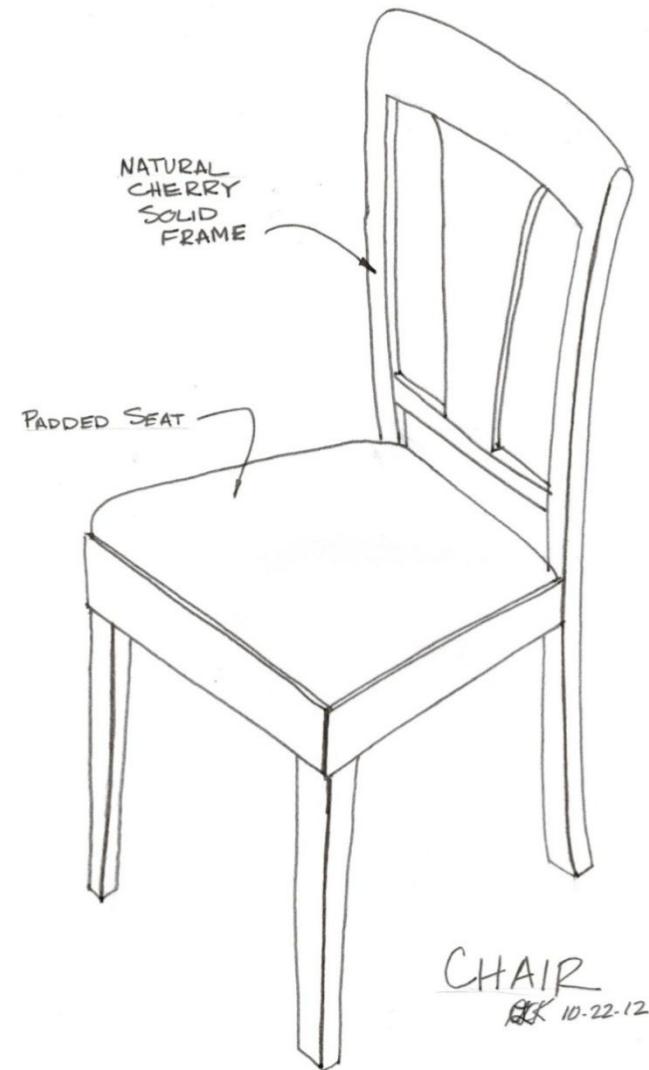
- Decide the light source position, and add tonal shading to two of the three faces
- A shading option is to use parallel lines drawn closely together on a face
- Increase contrast by cross-hatching lines on darkest face



# Isometric Sketch Example

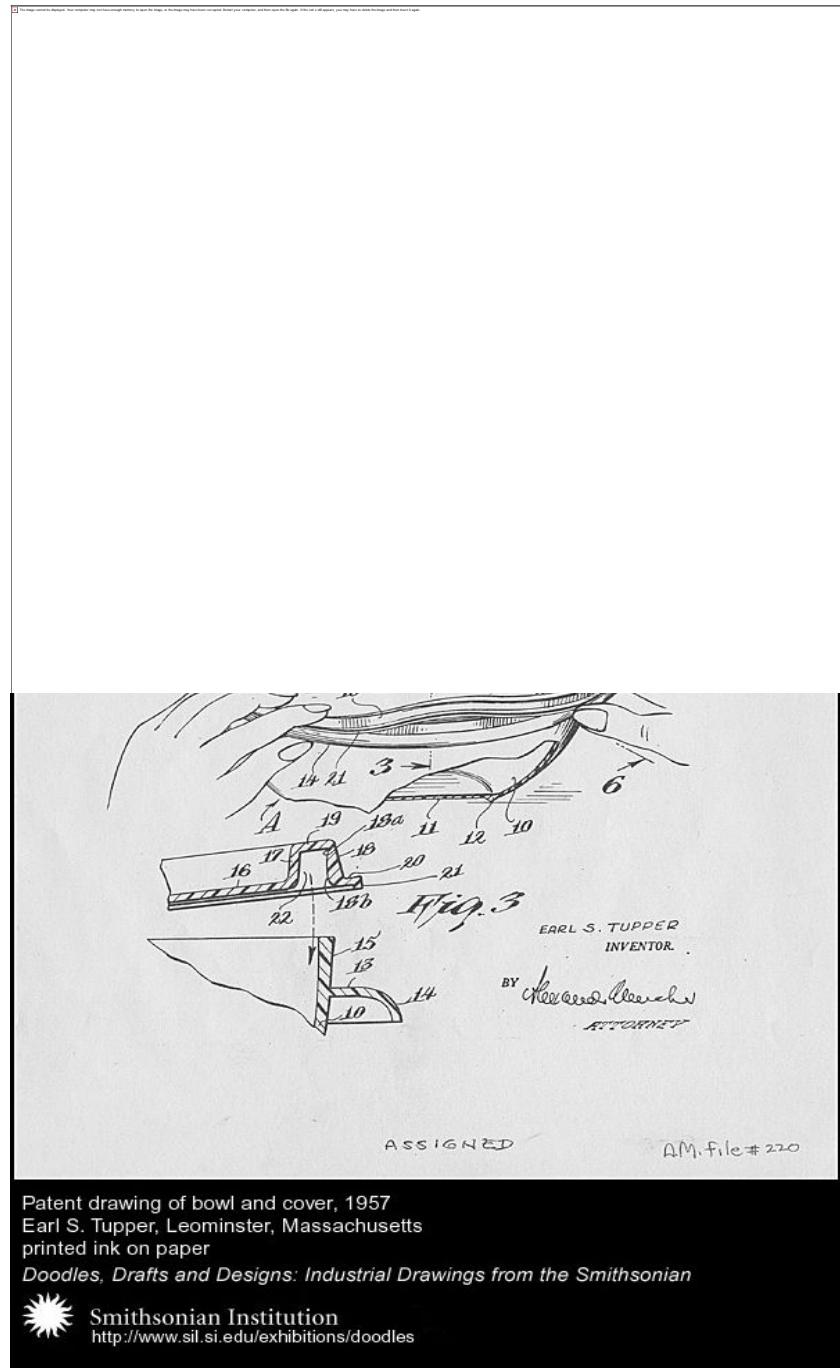


# Isometric Sketch Example



# Isometric Sketch Historical Example

- Earl Silas Tupper (1907 -1983) invented an air-tight Tupper Seal in 1947
- Patent drawings of bowl and cover, 1957 (isometric pictorial)



Courtesy Smithsonian Institute:  
<http://sil.si.edu/exhibitions/doodles>



Smithsonian Institution  
<http://www.sil.si.edu/exhibitions/doodles>