Descriptive Geometry

Nov 1, 2017

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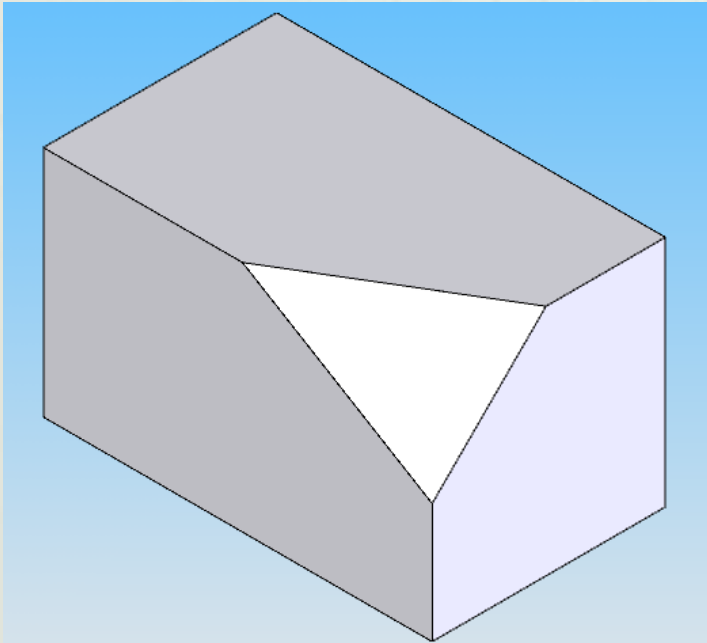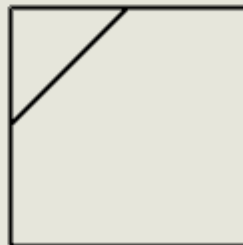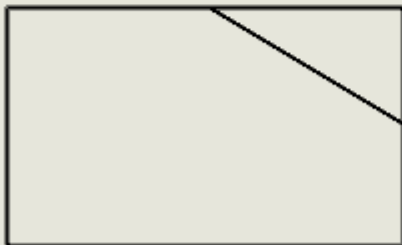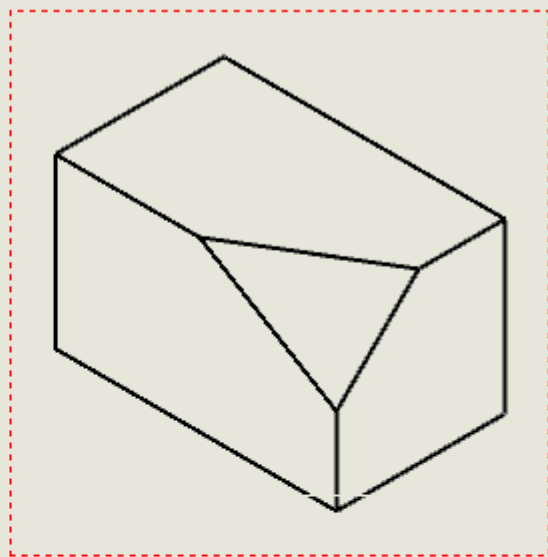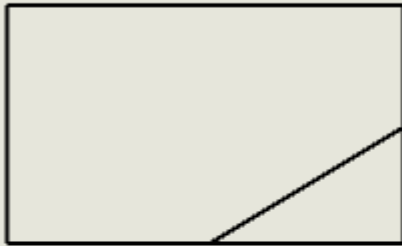
Oblique Planes

Isometric View
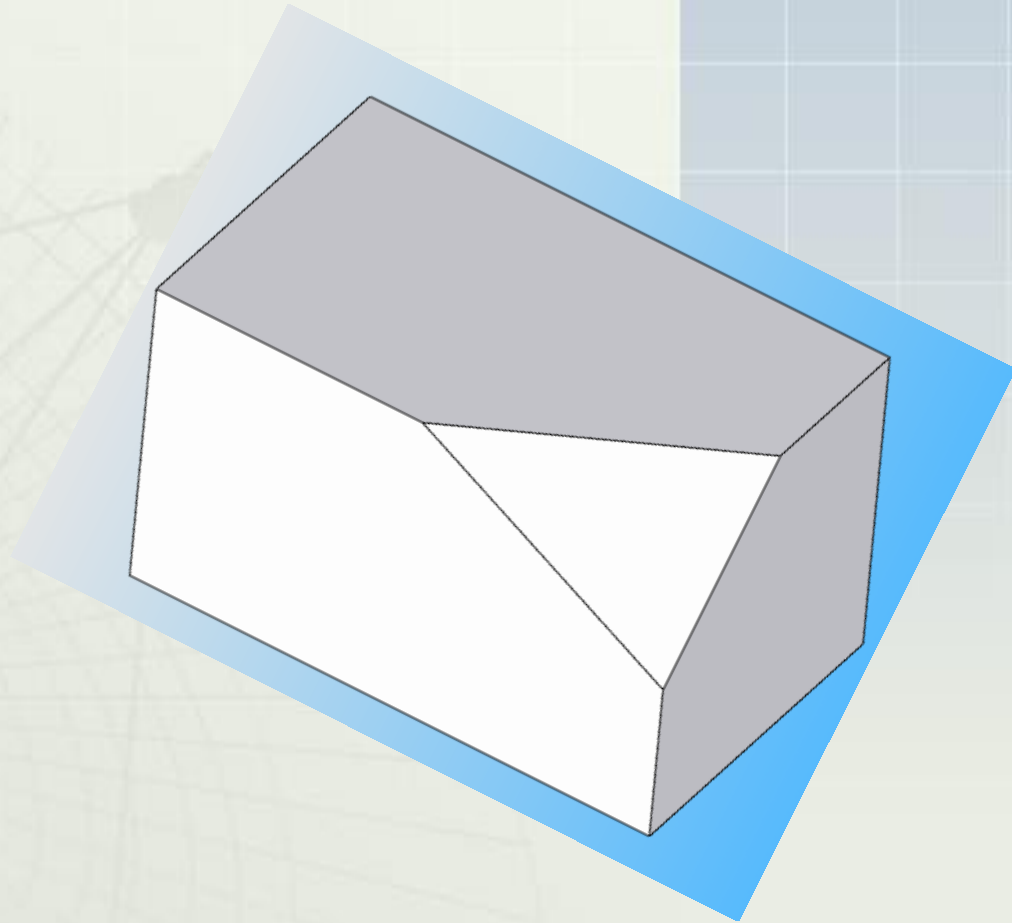
View normal to oblique plane

Oblique Planes

Oblique plane is not true shape or size in any of these views

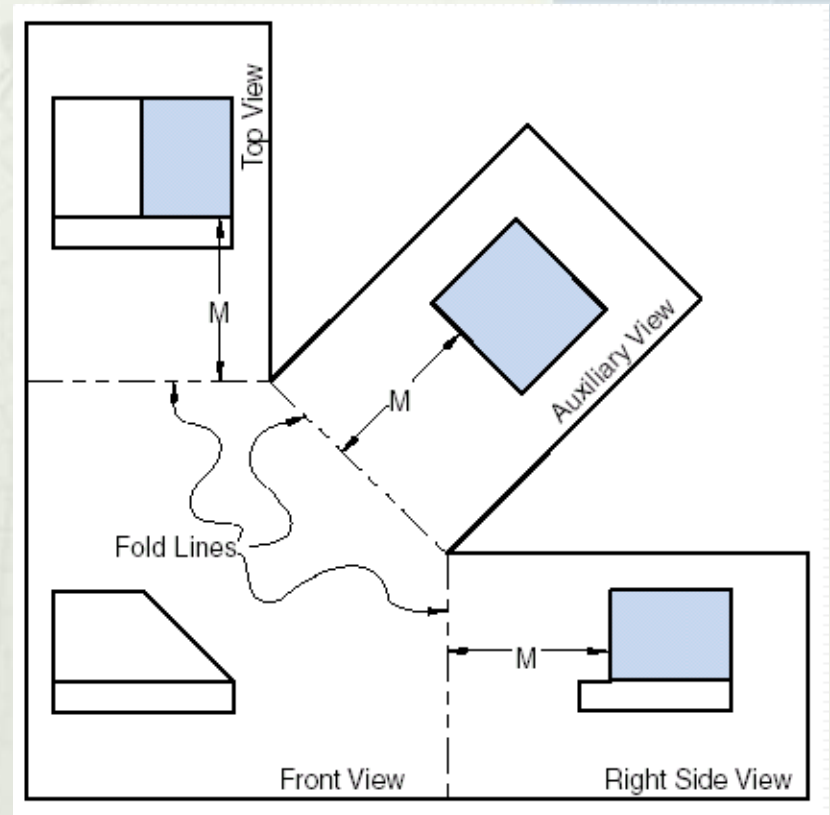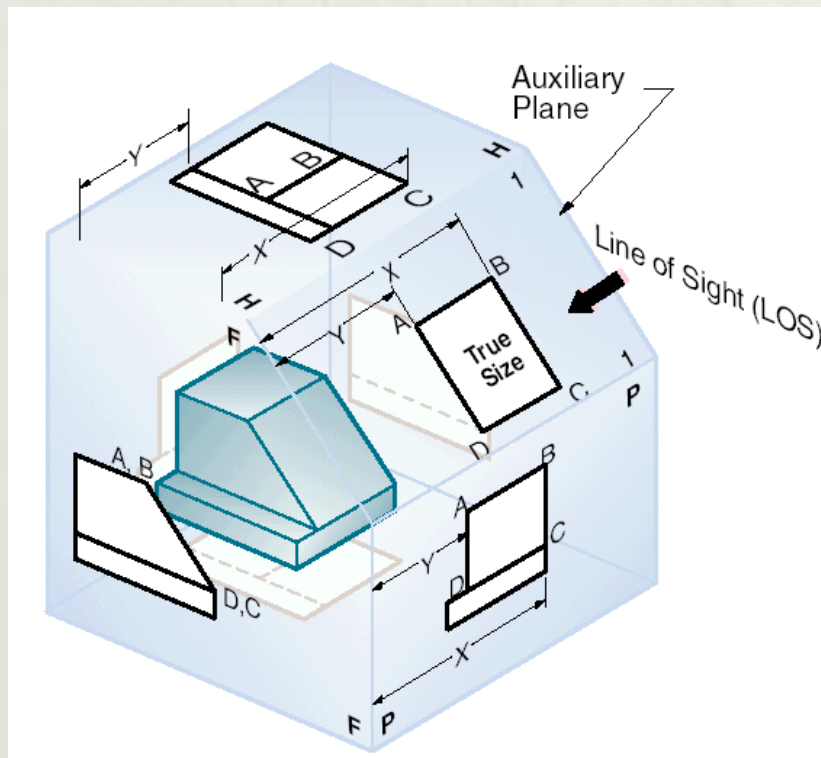# Learning Objectives

- Recognize types of lines and planes
- Find the length of a line using descriptive geometry
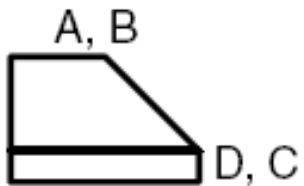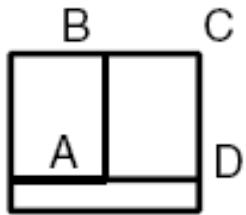- Find the true shape and size of a plane

Auxiliary Views

Recall from previous lecture

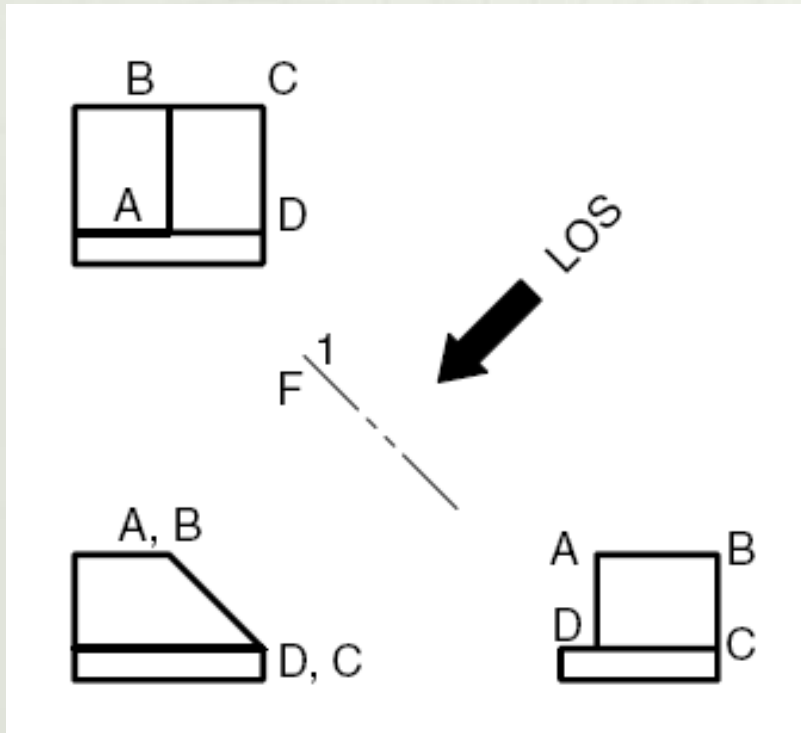# Creating an Aux View 1

◆ Create a true size for the surface ABCD

Creating an Aux View 2

- Create a fold line parallel to the surface
- The line of site (LOS) is perpendicular to this surface

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Creating an Aux View 3

- Draw Fold Lines
  - H-F and F-P
- Lines at a distance X from the rear edge of each view
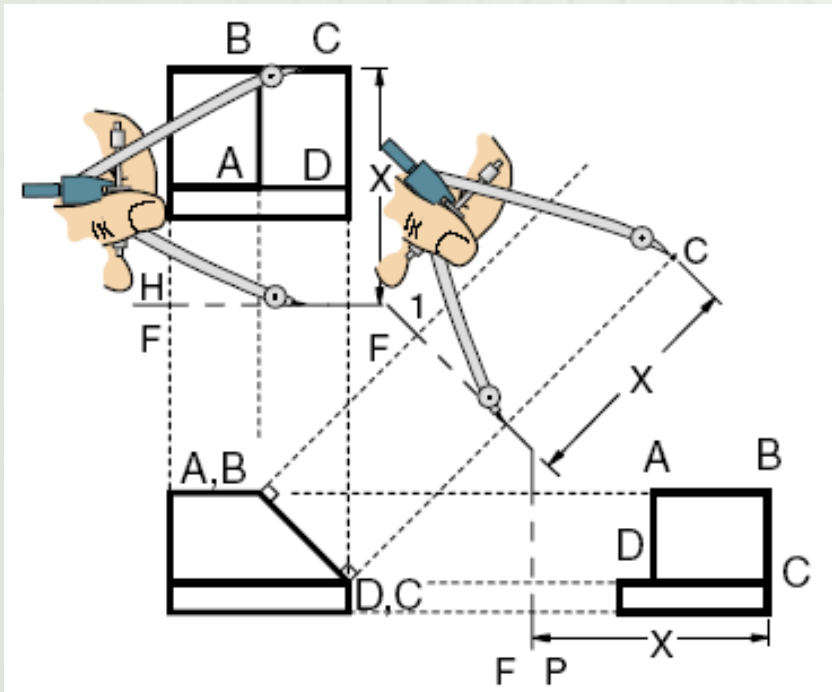- Draw projection lines between each view

Creating an Aux View 4

- ◆ Create construction lines perpendicular to the surface
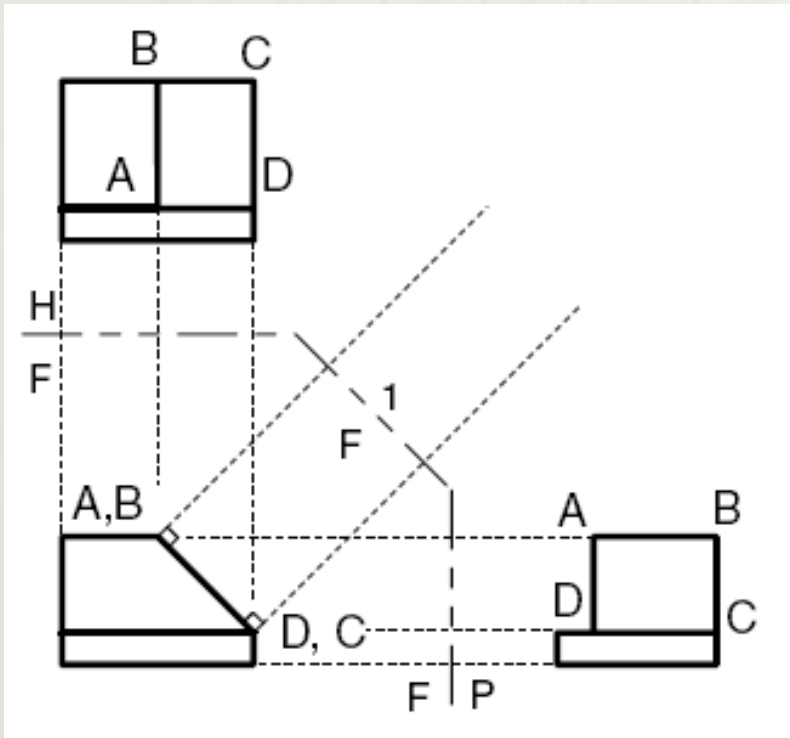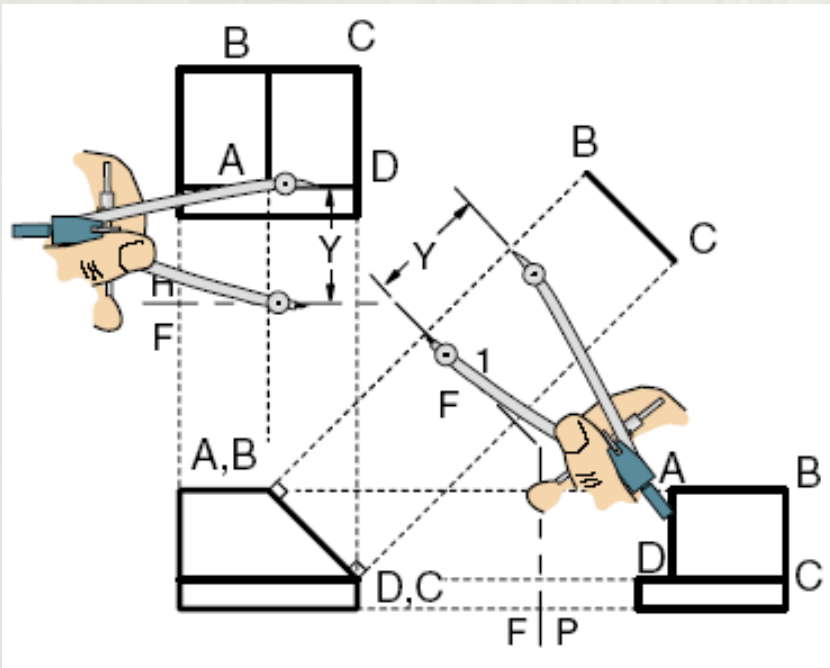
Creating an Aux View 5

- ◆ Measure the distance from the fold line H-F to points B and C
- ◆ Transfer these measurements with respect to fold line F-1
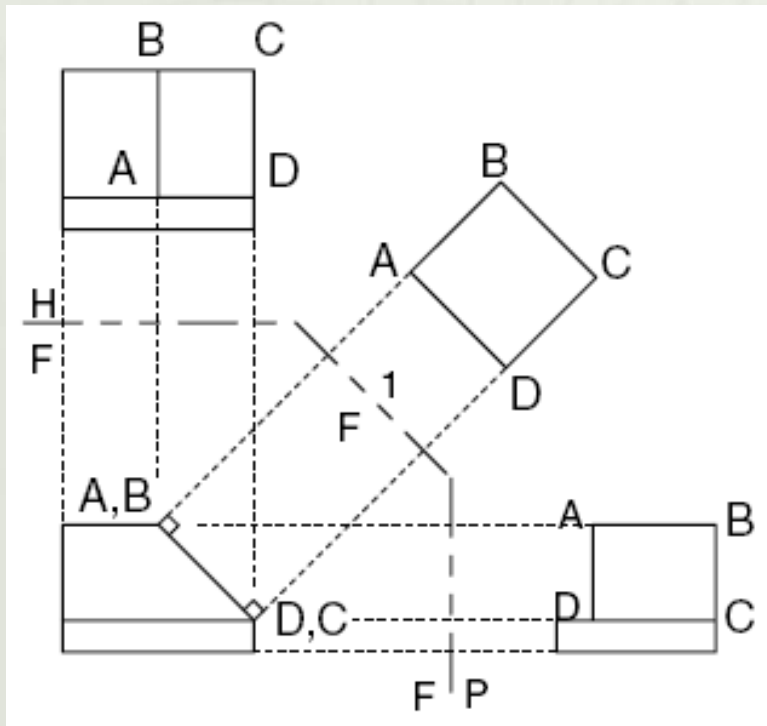
Creating an Aux View 6

- ◆ Repeat the measurements for points A and D
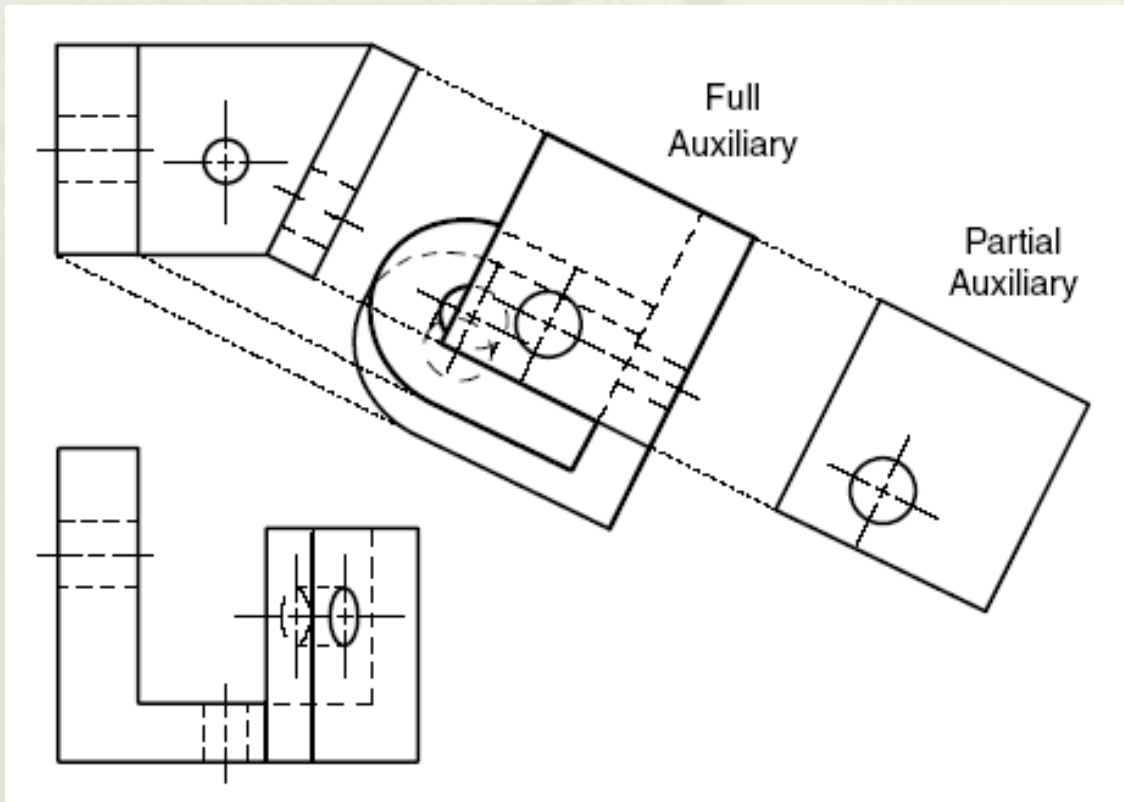- ◆ Transfer into the Aux view

Creating an Aux View 7

- We now have the true shape of surface ABCD
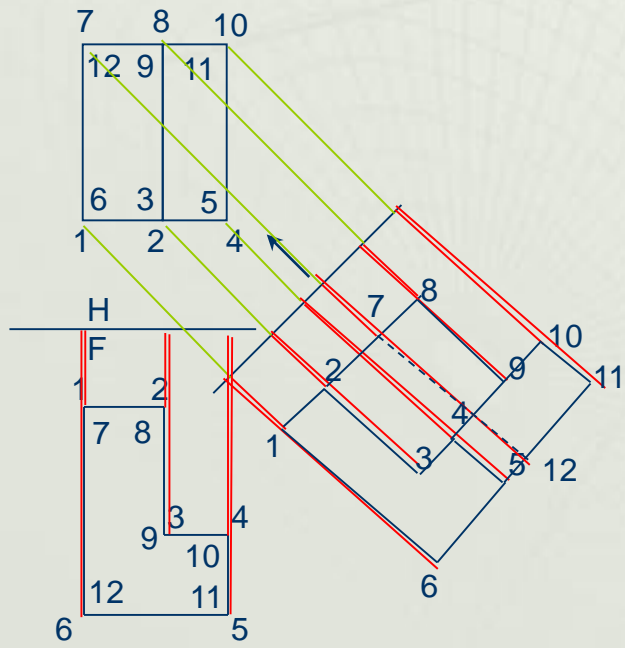- We can measure the shape directly to find dimensions

Partial Aux Views

- ◆ Don't show other features
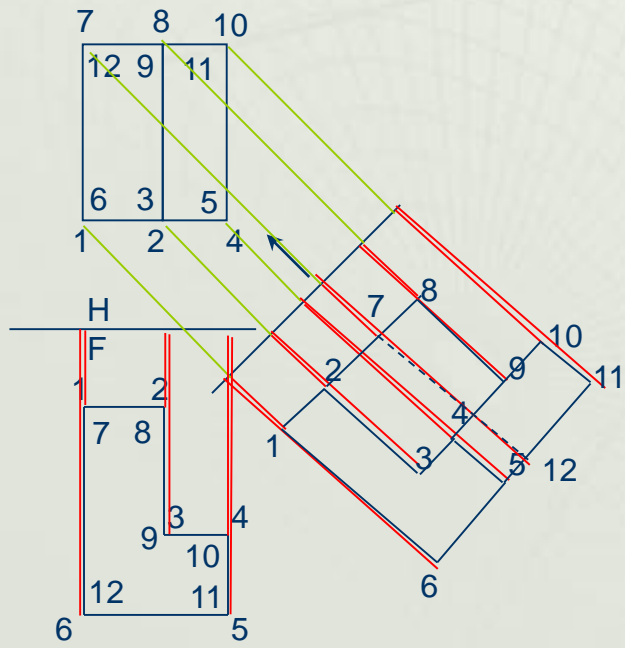- ◆ Easier to draw
- ◆ Easier to understand
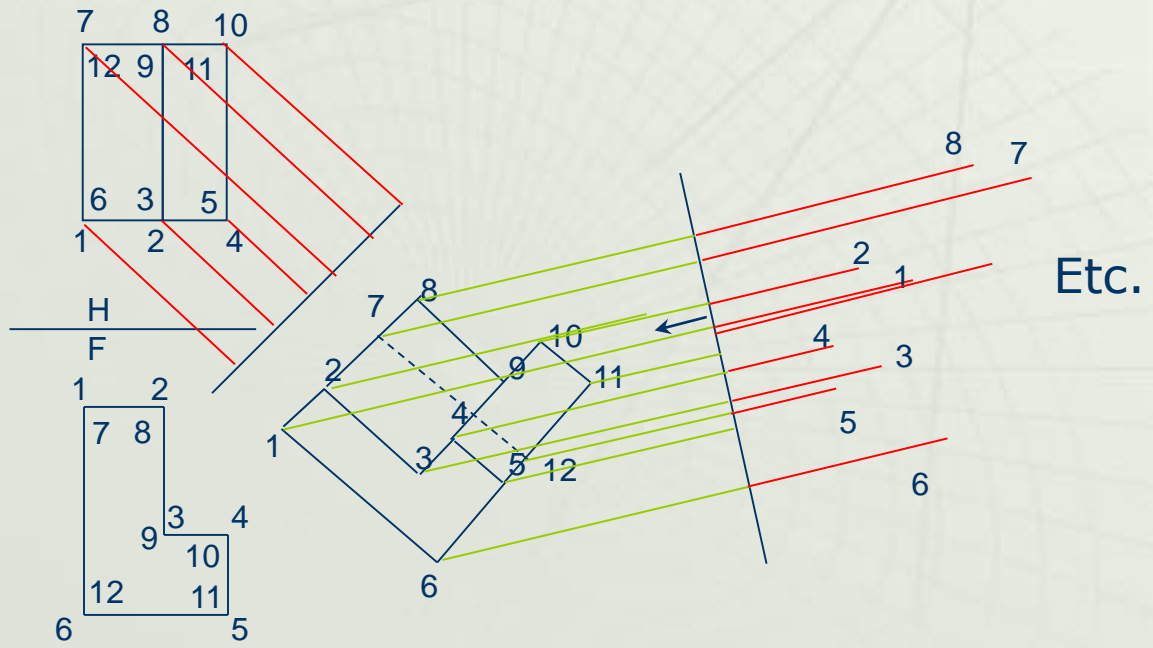
Successive Aux (Full) Views
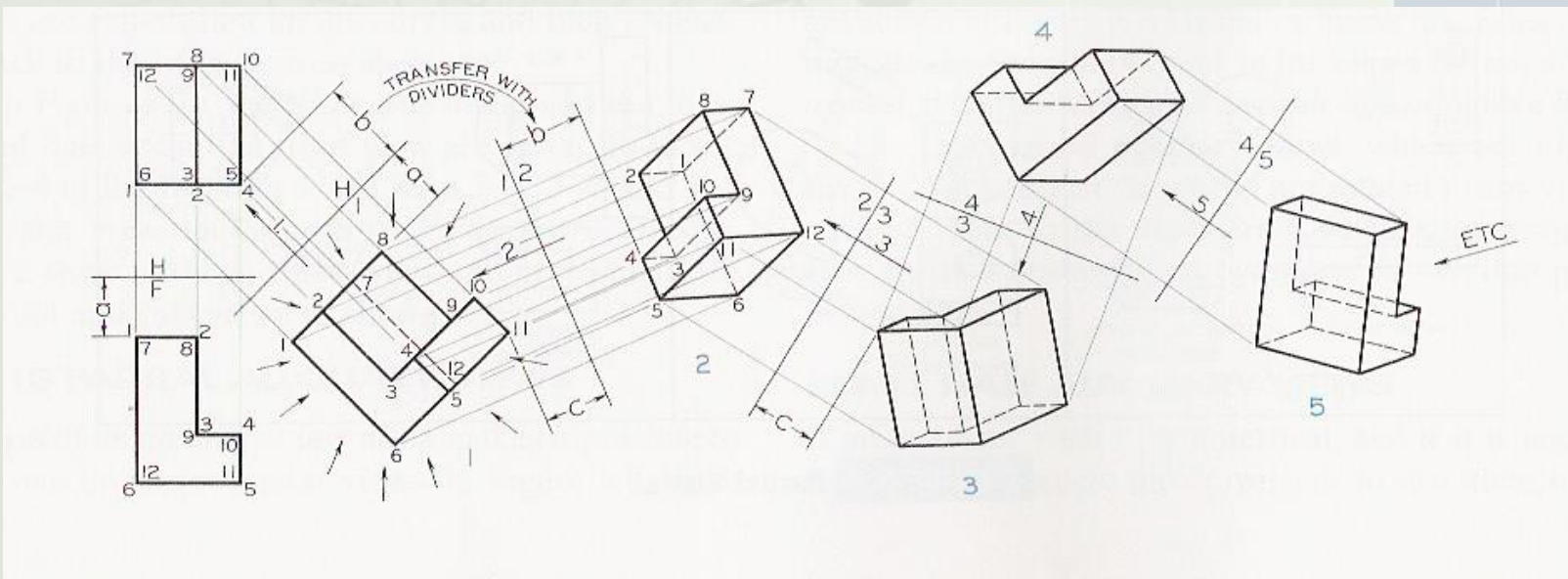
Successive Aux Views

Successive Aux Views

Successive Aux Views

Descriptive Geometry

- Find the actual shape and size of a shape
  - Lines
  - Planes
- Visually doing the mathematical operation:

$$L = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

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True Length of a Line

- ◆ True length: a straight line distance between two points
  - ▪ If a line is positioned parallel to a projection plane and the line of site is perpendicular to that projection plane, the line will appear as a true length (see Auxiliary View Example)
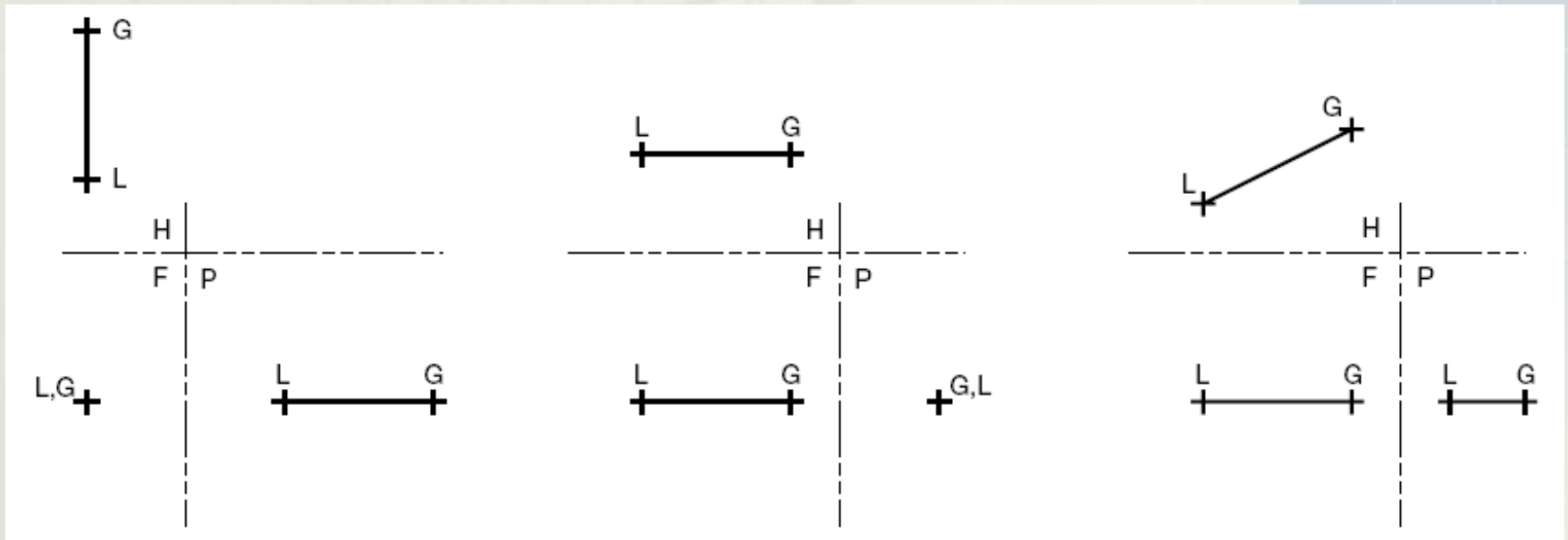
Types of Lines

- Principal Line: Parallel to one of the principal projection planes
    - Frontal Line: Parallel to frontal plane
    - Horizontal Line: Parallel to horizontal plane
    - Profile Line: Parallel to profile plane
- Oblique Line: Is not parallel to any of the principal projection planes

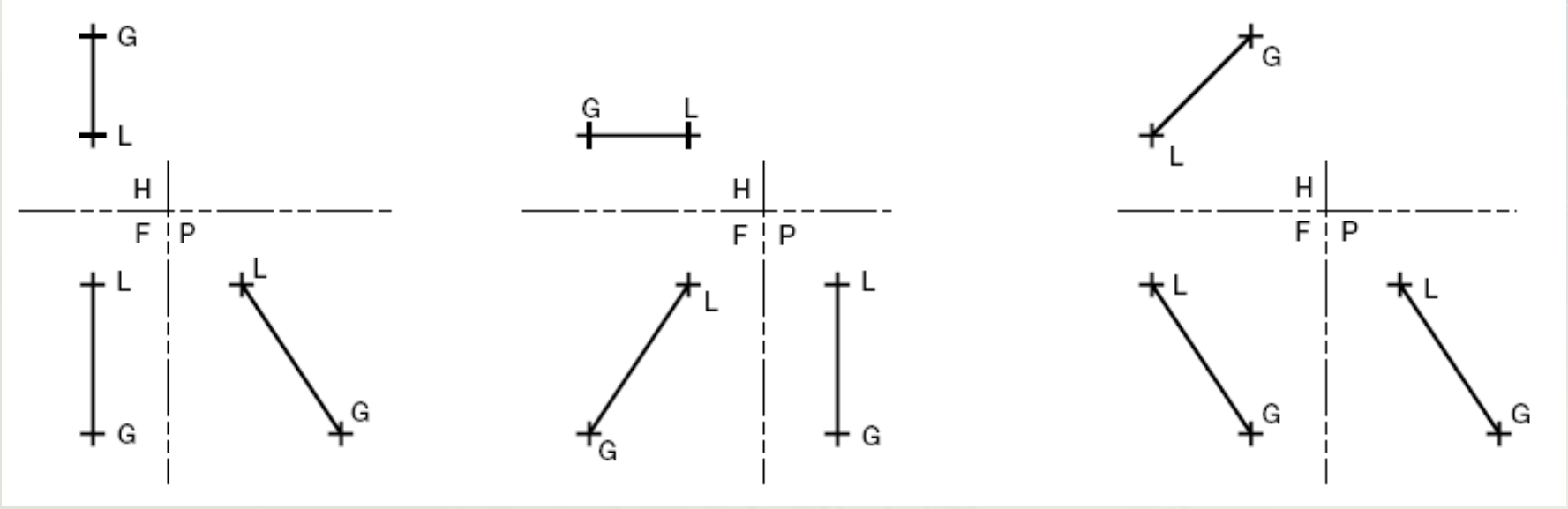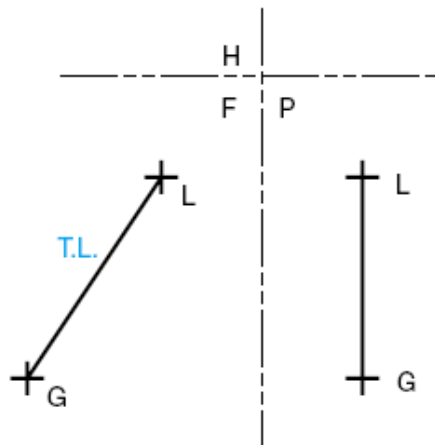School of
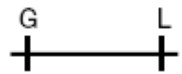Engineering Science

Horizontal Lines

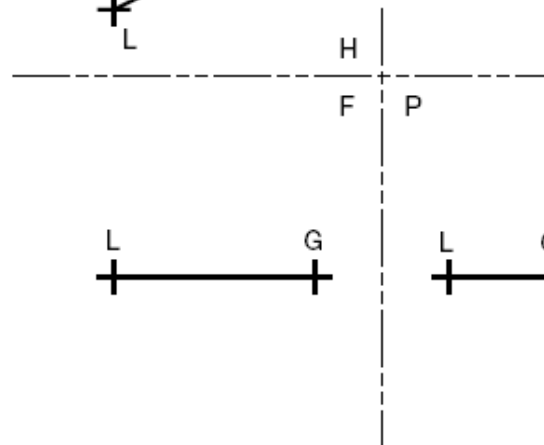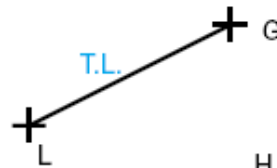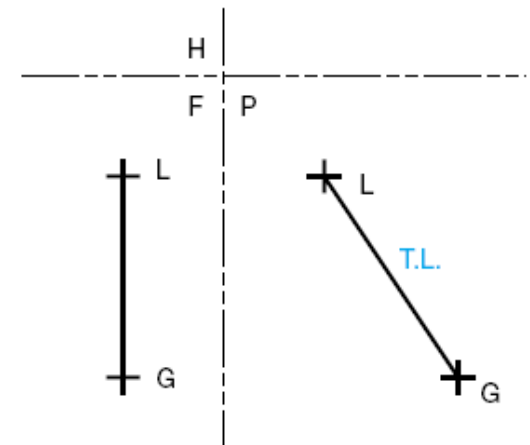Note: A point is represented with a "+" mark

Inclined Lines

oblique line
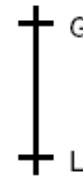
Principal Lines

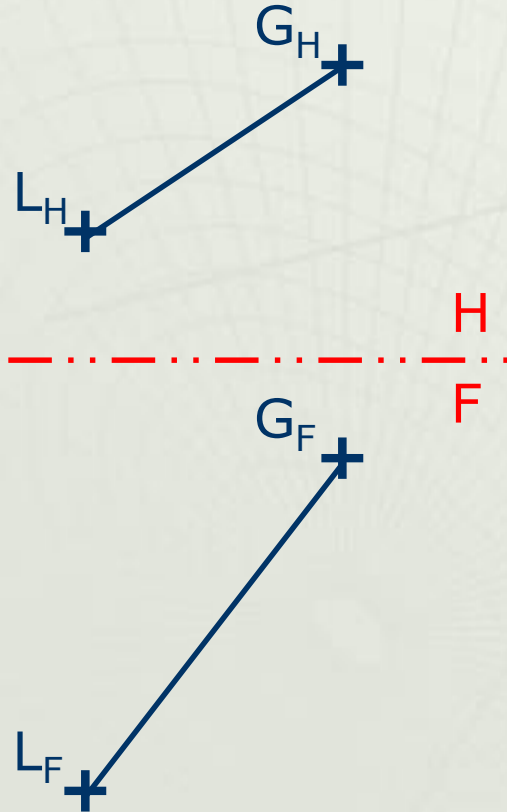(A) Frontal Line (B) Horizontal Line (C) Profile Line

Finding True Lengths

G_H

L_H

H
F

G_F

L_F

Finding True Lengths

G_H

L_H

H

F

G_F

F

1

L_F
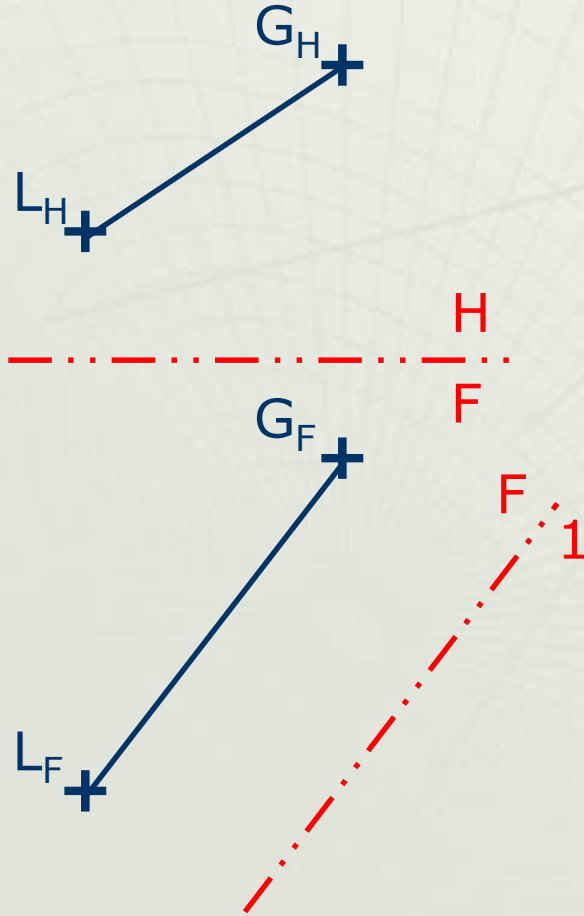
- Step 1: Create Fold Line F-1

Finding True Lengths

G_H

L_H

H

F

G_F

- Step 1: Create Fold Line F-1
- Step 2: Draw perpendicular projectors from L_F and G_F to F-1

1

L_F

Finding True Lengths

- Step 1: Create Fold Line F-1
- Step 2: Draw perpendicular projectors from L_F and G_F to F-1
- Step 3: Measure distance from L_H to H-F and G_H to H-F
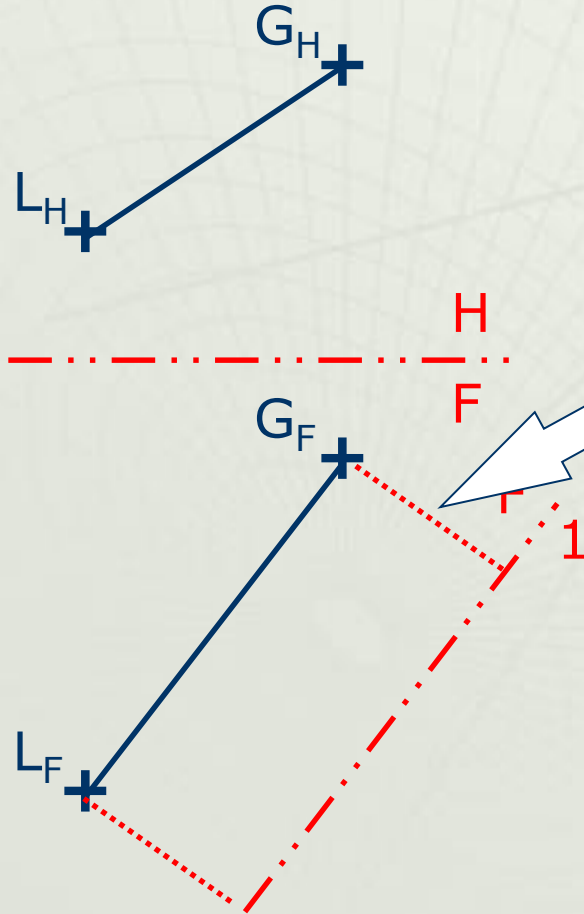
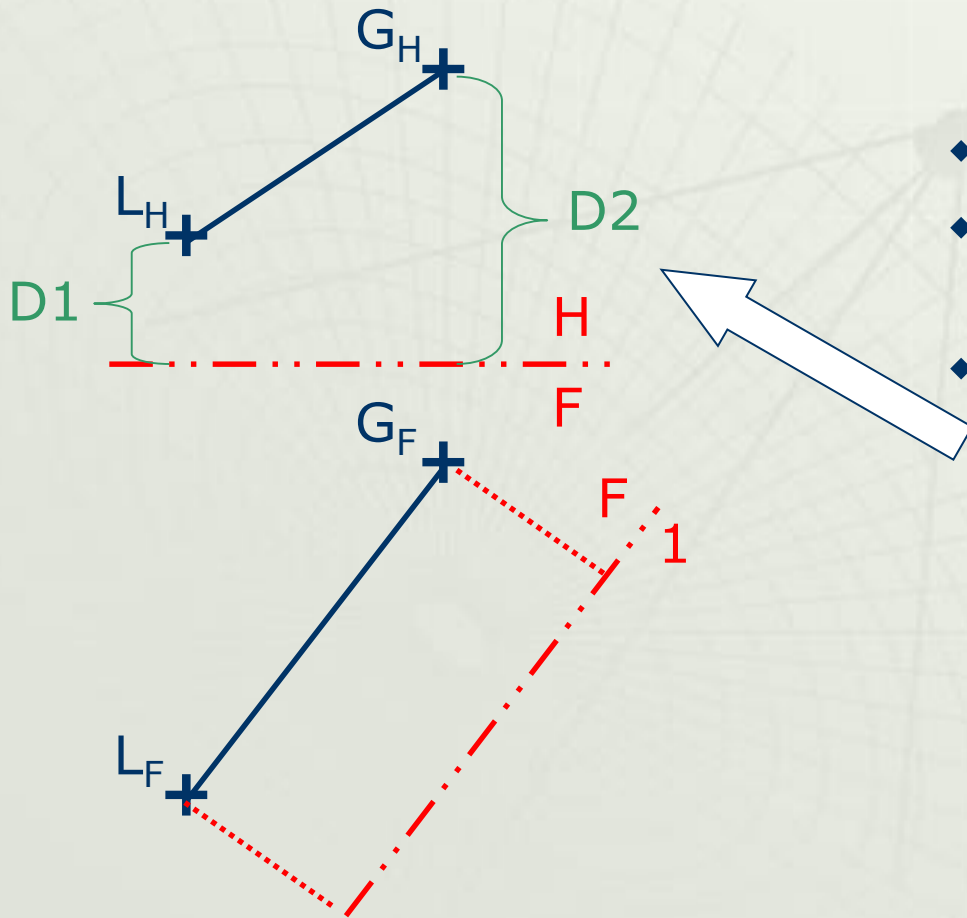# Finding True Lengths

- Step 1: Create Fold Line F-1
- Step 2: Draw perpendicular projectors from L_F and G_F to F-1
- Step 3: Measure distance from L_H to H-F and G_H to H-F
- Step 4: Transfer distances to the aux view using F-1

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Finding True Lengths

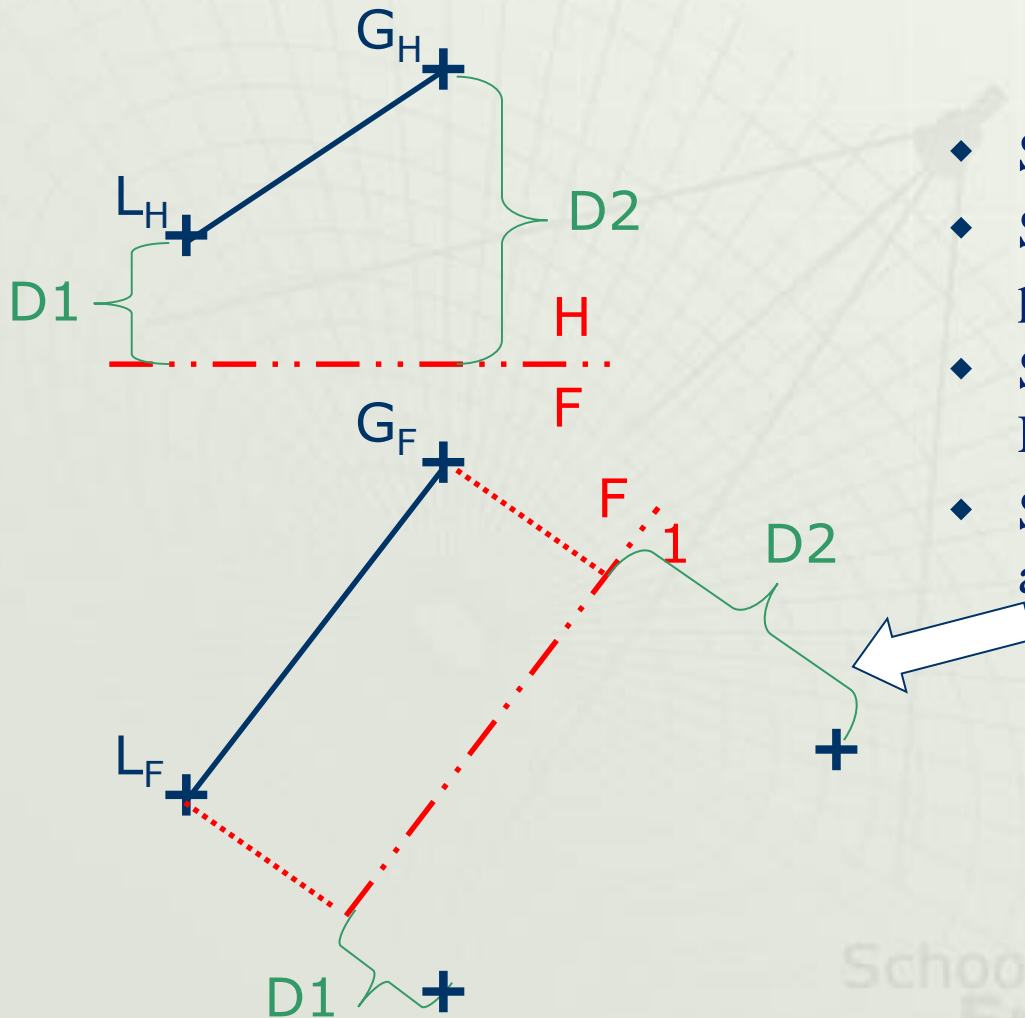G_H

L_H

D1

$D2$

H
F

G_F

F
1

$D2$

L_F

D1

This is the True Length

- Step 1: Create Fold Line F-1
- Step 2: Draw perpendicular projectors from L_F and G_F to F-1
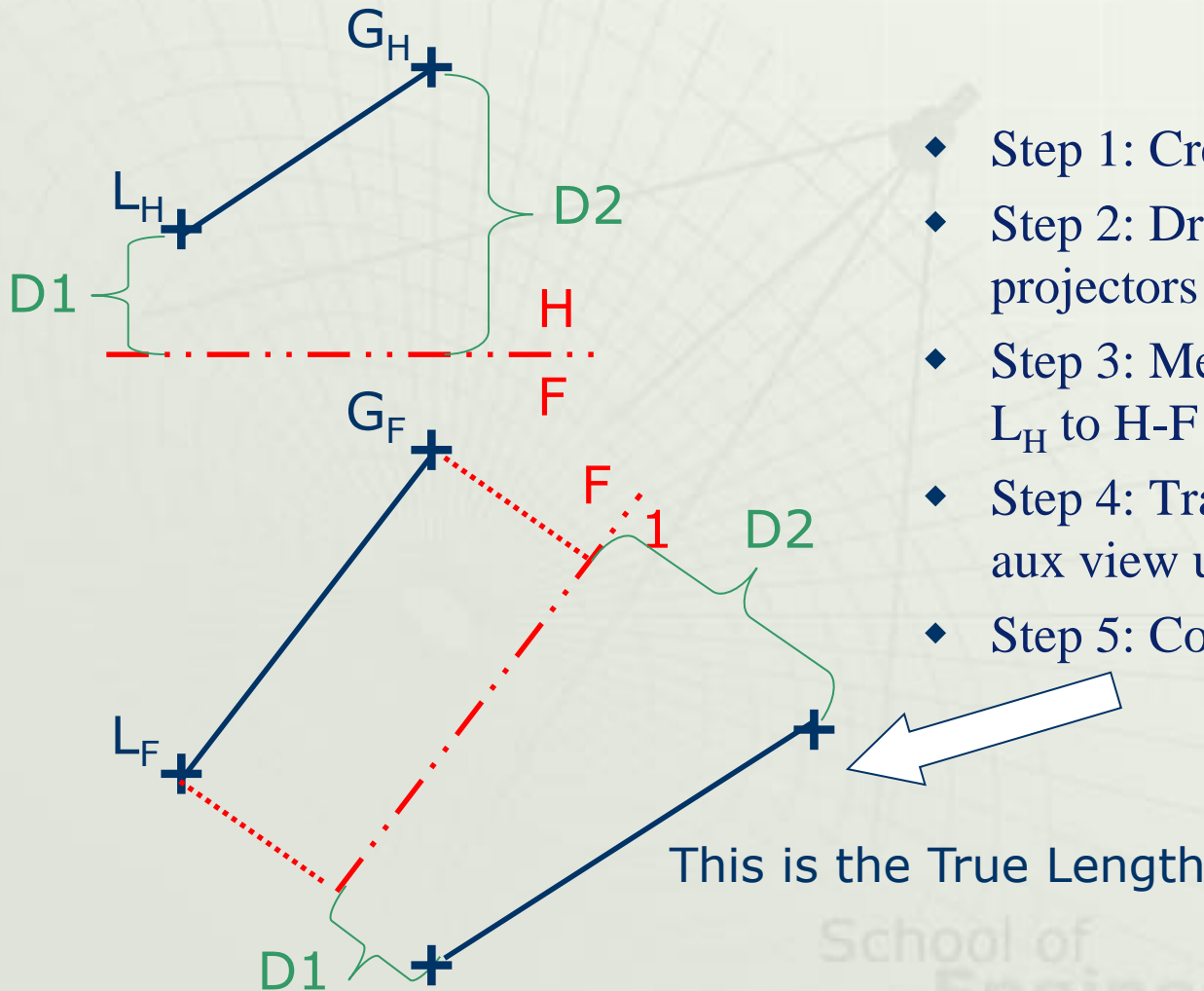- Step 3: Measure distance from L_H to H-F and G_H to H-F
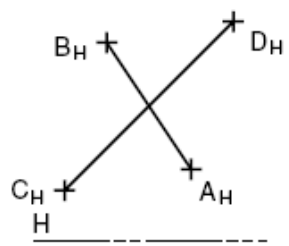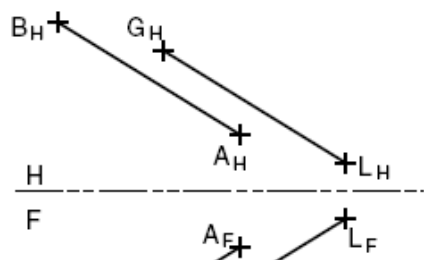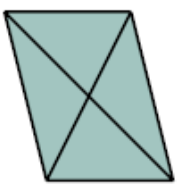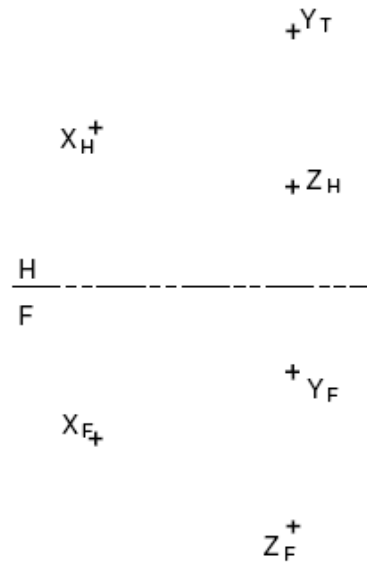- Step 4: Transfer distances to the aux view using F-1
- Step 5: Connect the dots
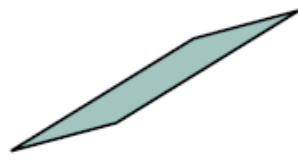
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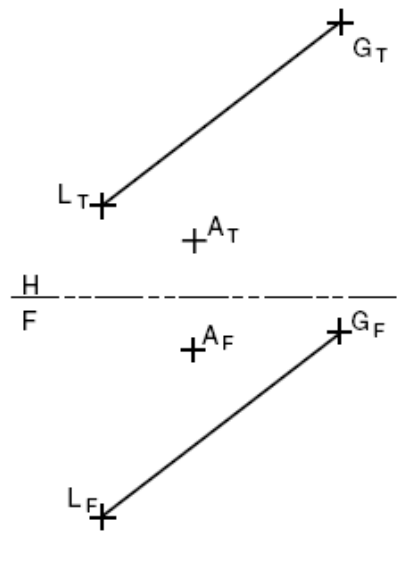
Planes

Intersecting lines   Two parallel lines   Three non-linear points   A point and a line
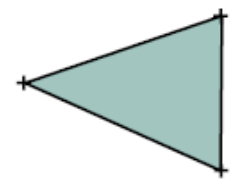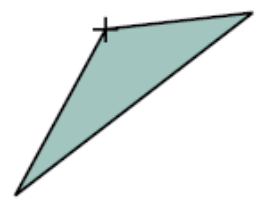
Types of Planes

- Horizontal Plane: Appears as True Shape and Size (TSP) in top and bottom views.
- Vertical Plane: Appears as an edge in top and bottom views. Can appear several ways in other views.
- Profile Plane: Vertical Plane that is parallel to the profile projection plane.
- Frontal Plane: Vertical Plane that is parallel to the frontal projection plane.
- Inclined Plane: Perpendicular but not parallel to a principal projection plane.
- Oblique: A plane that appears as a surface but is not TSP in every principal view.

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(A) Horizontal Plane

(B) Profile Plane

(C) Frontal Plane

(D) Inclined Plane

(E) Inclined Plane

(F) Inclined Plane

(G) Oblique Plane
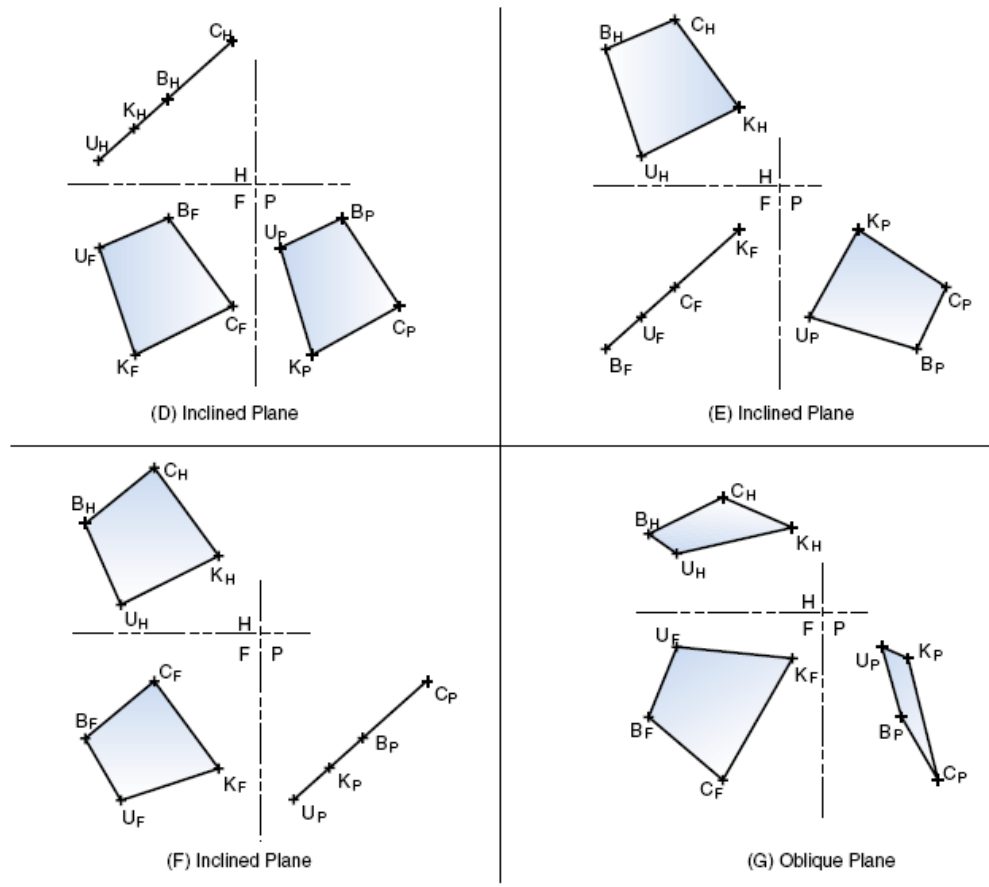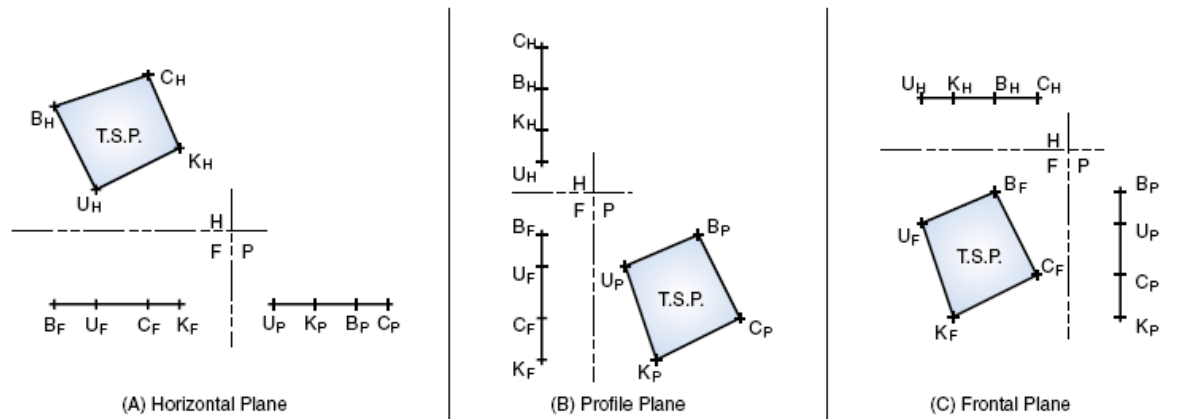
True Size of a Plane

True Size of a Plane
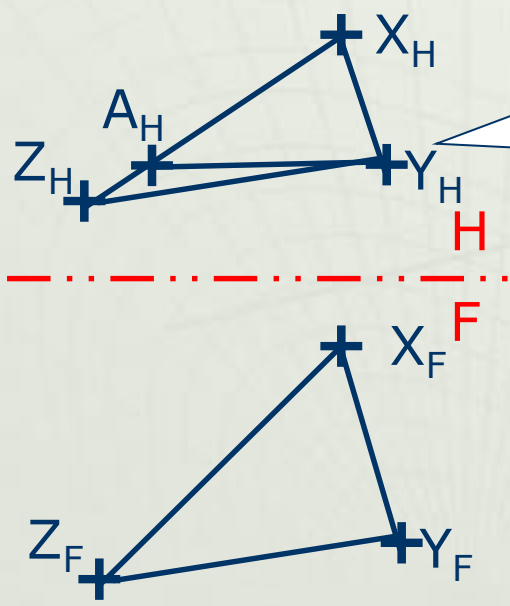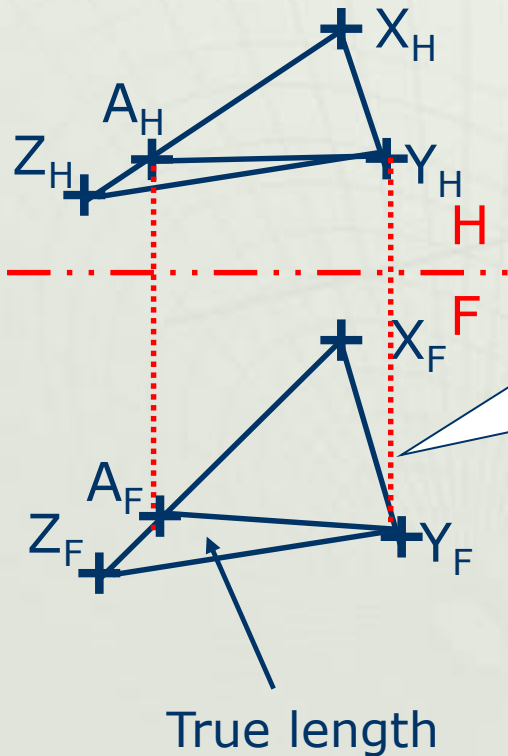
- ◆ Step 1: Create a line parallel to H-F (AY)

X_H

A_H

Z_H Y_H

H

F

X_F

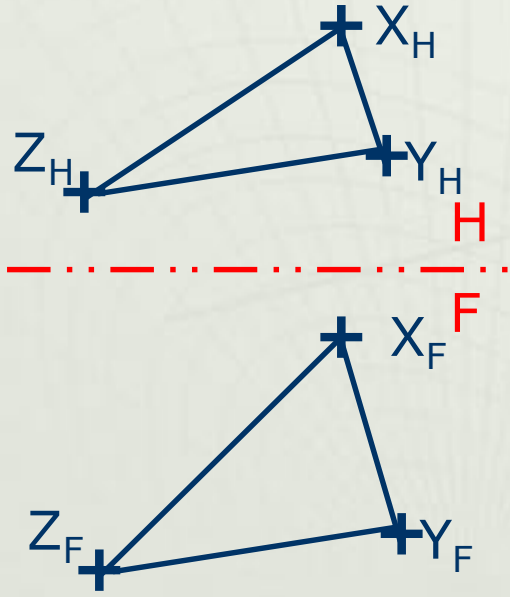Z_F Y_F

True Size of a Plane

- ◆ Step 1: Create a line parallel to H-F (AY)
- ◆ Step 2: Project line into the other view

X_H

A_H

Z_H

Y_H

H

F

X_F

A_F

Z_F

Y_F

True length

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True Size of a Plane

X_H

A_H

Z_H

Y_H

H

F

X_F

F 1

A_F

Z_F

Y_F

- ◆ Step 1: Create a line parallel to H-F (AY)
- ◆ Step 2: Project line into the other view
- ◆ Step 3: Construct a fold line perpendicular to AY

True Size of a Plane

- Step 1: Create a line parallel to H-F (AY)
- Step 2: Project line into the other view
- Step 3: Construct a fold line perpendicular to AY
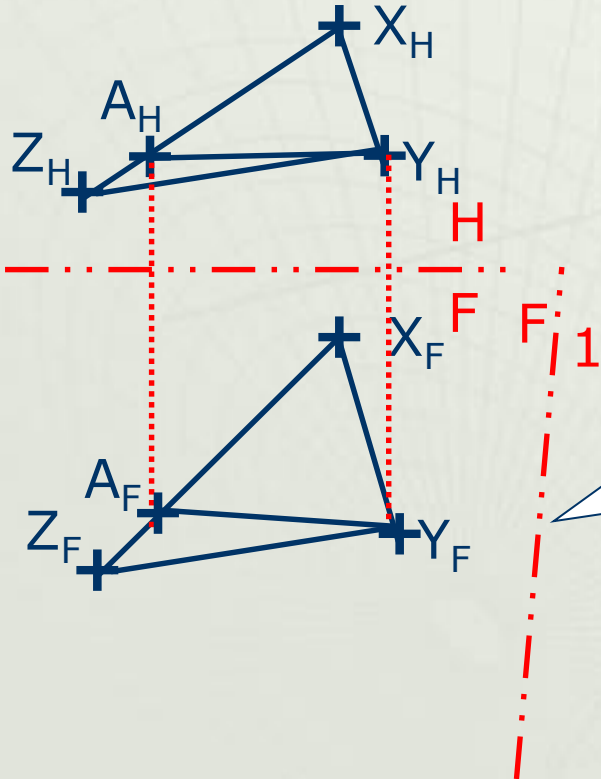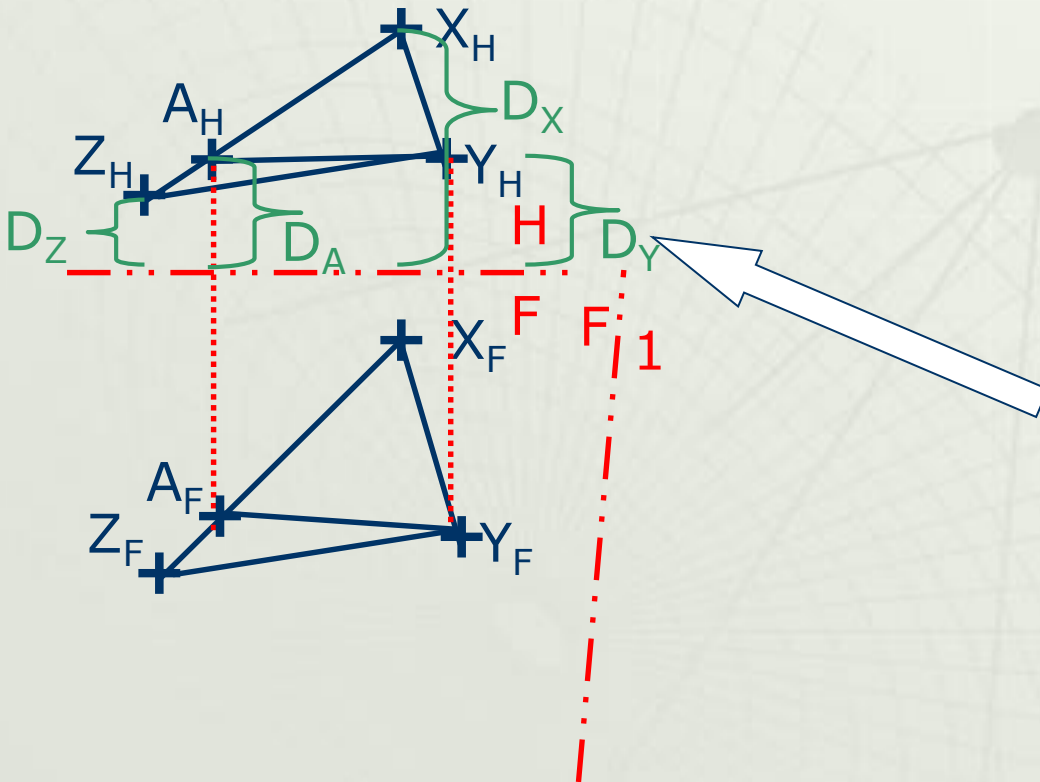- Step 4: Measure distances for the points

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True Size of a Plane

- Step 1: Create a line parallel to H-F (AY)
- Step 2: Project line into the other view
- Step 3: Construct a fold line perpendicular to AY
- Step 4: Measure distances for the points
- Step 5: Transfer distances

This is an edge view

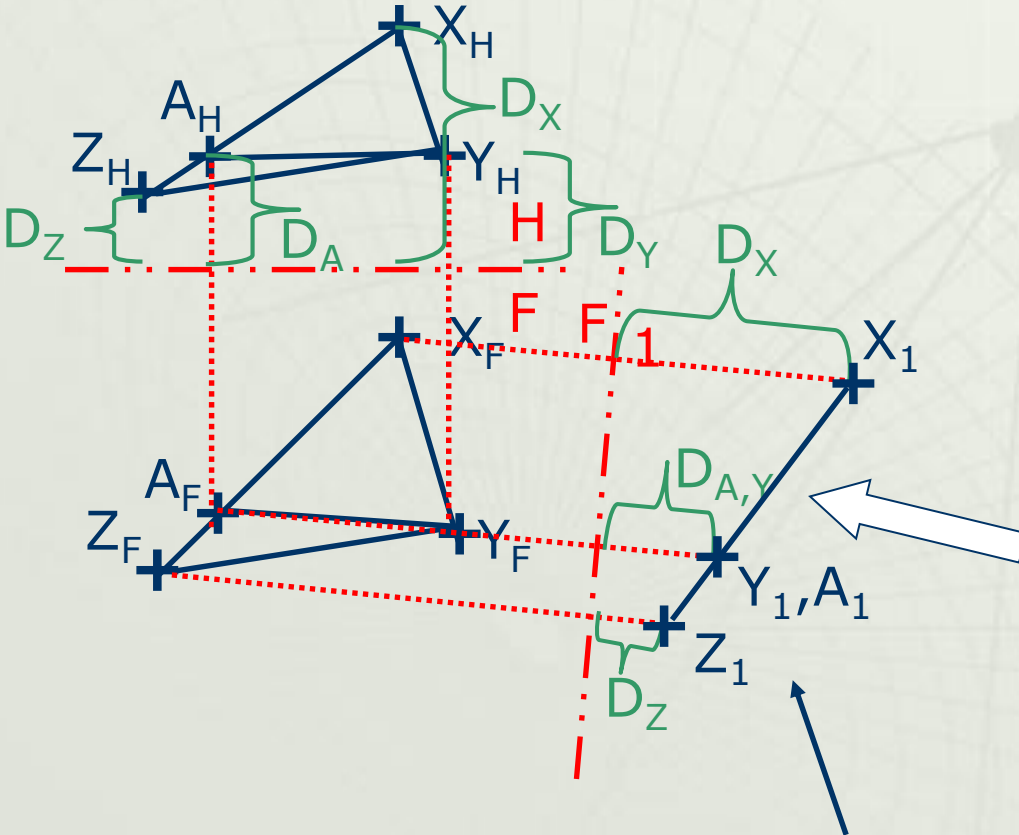# True Size of a Plane

- Step 1: Create a line parallel to H-F (AY)
- Step 2: Project line into the other view
- Step 3: Construct a fold line perpendicular to AY
- Step 4: Measure distances for the points
- Step 5: Transfer distances
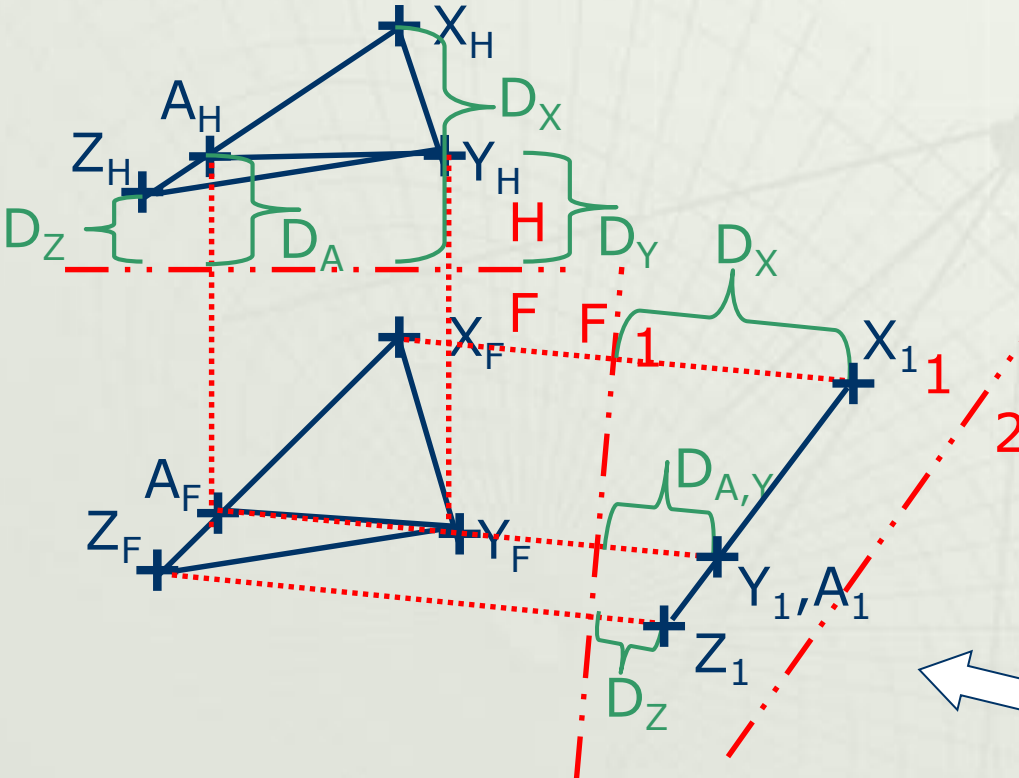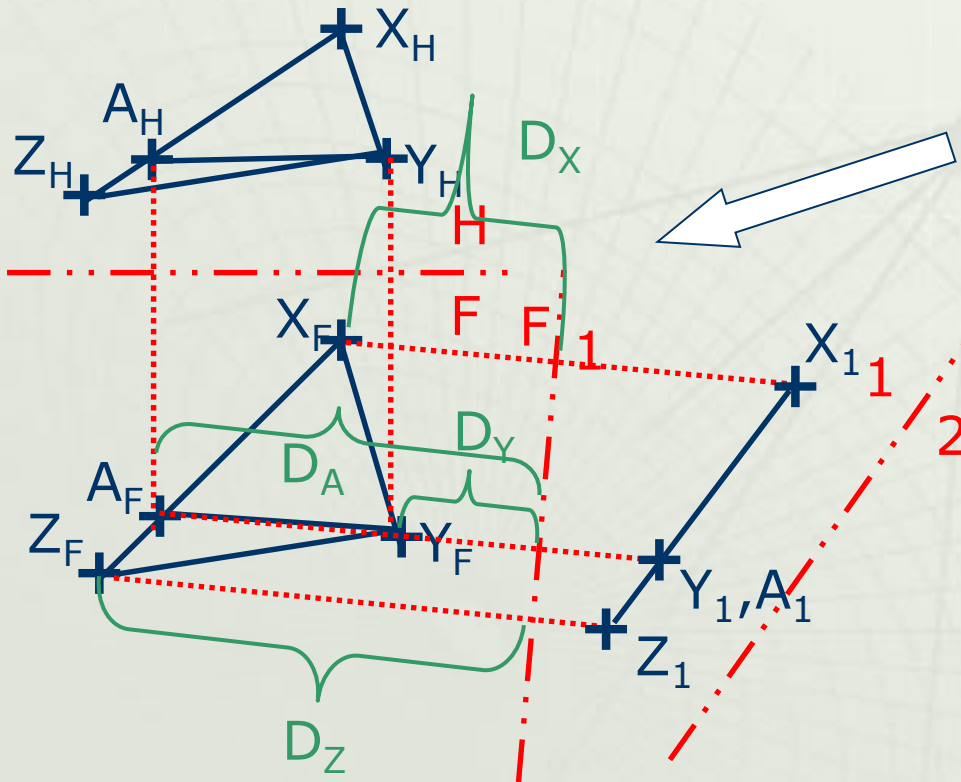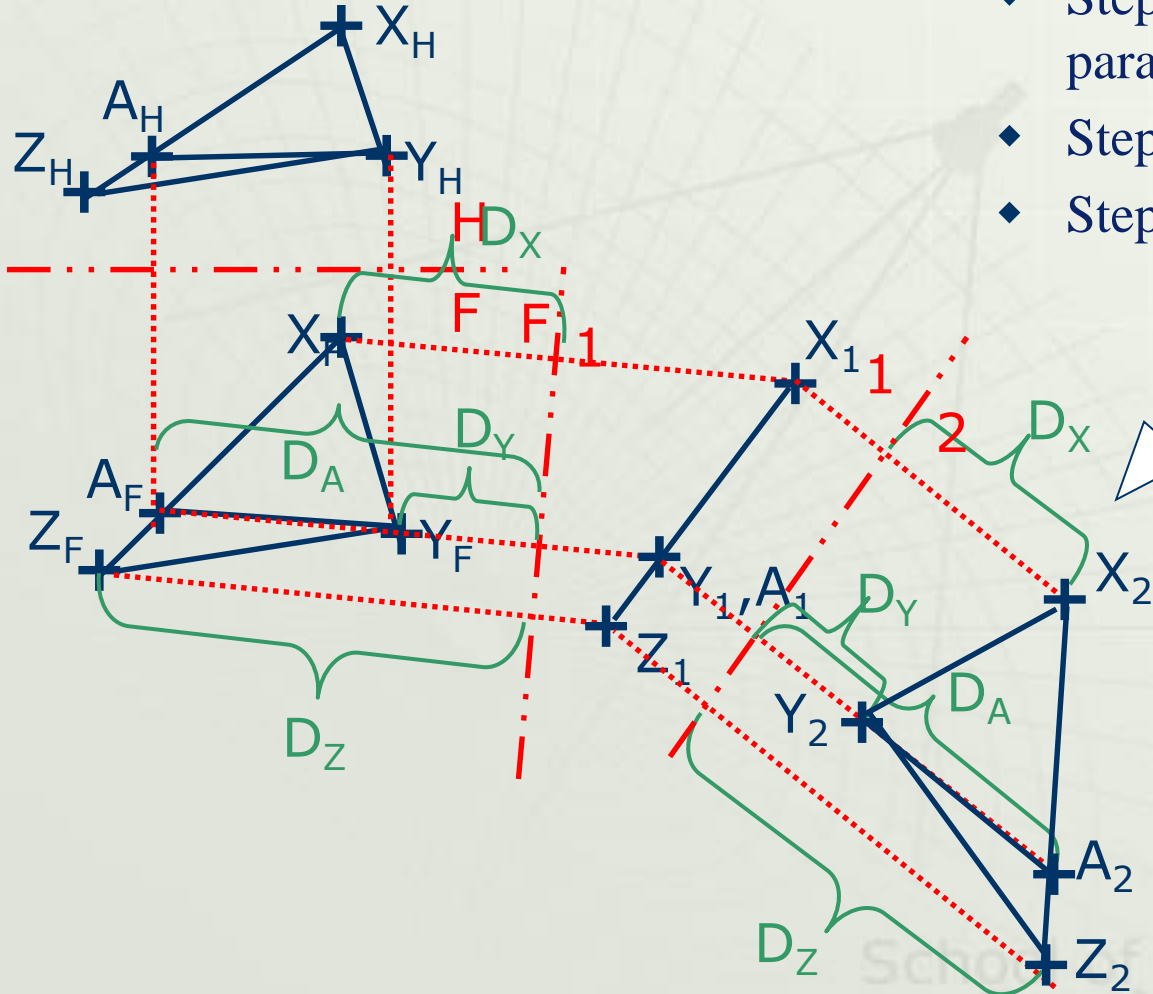- Step 6: Construct a fold line parallel to the edge view

True Size of a Plane

- Step 6: Construct a fold line parallel to the edge view
- Step 7: Measure distances

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True Size of a Plane

- Step 6: Construct a fold line parallel to the edge view
- Step 7: Measure distances
- Step 8: Transfer distances

True size of plane XYZ