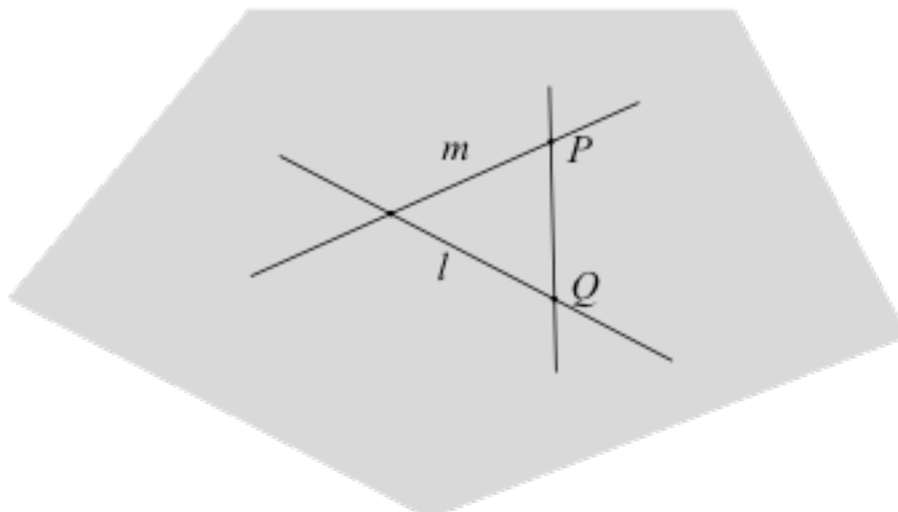
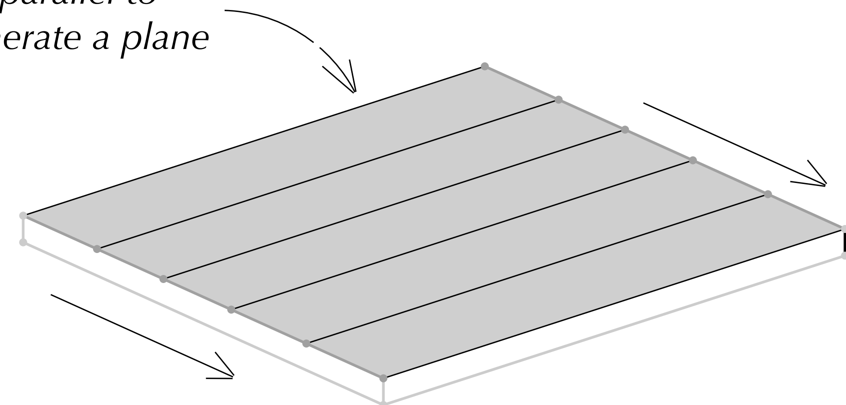
48-175
Descriptive Geometry

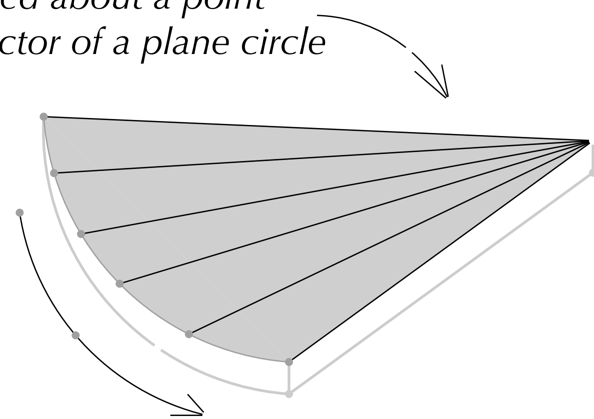
Planes in Descriptive Geometry

A spatial figure is a ***plane*** whenever for any two points on the figure, the line specified by the points also lies on the figure.

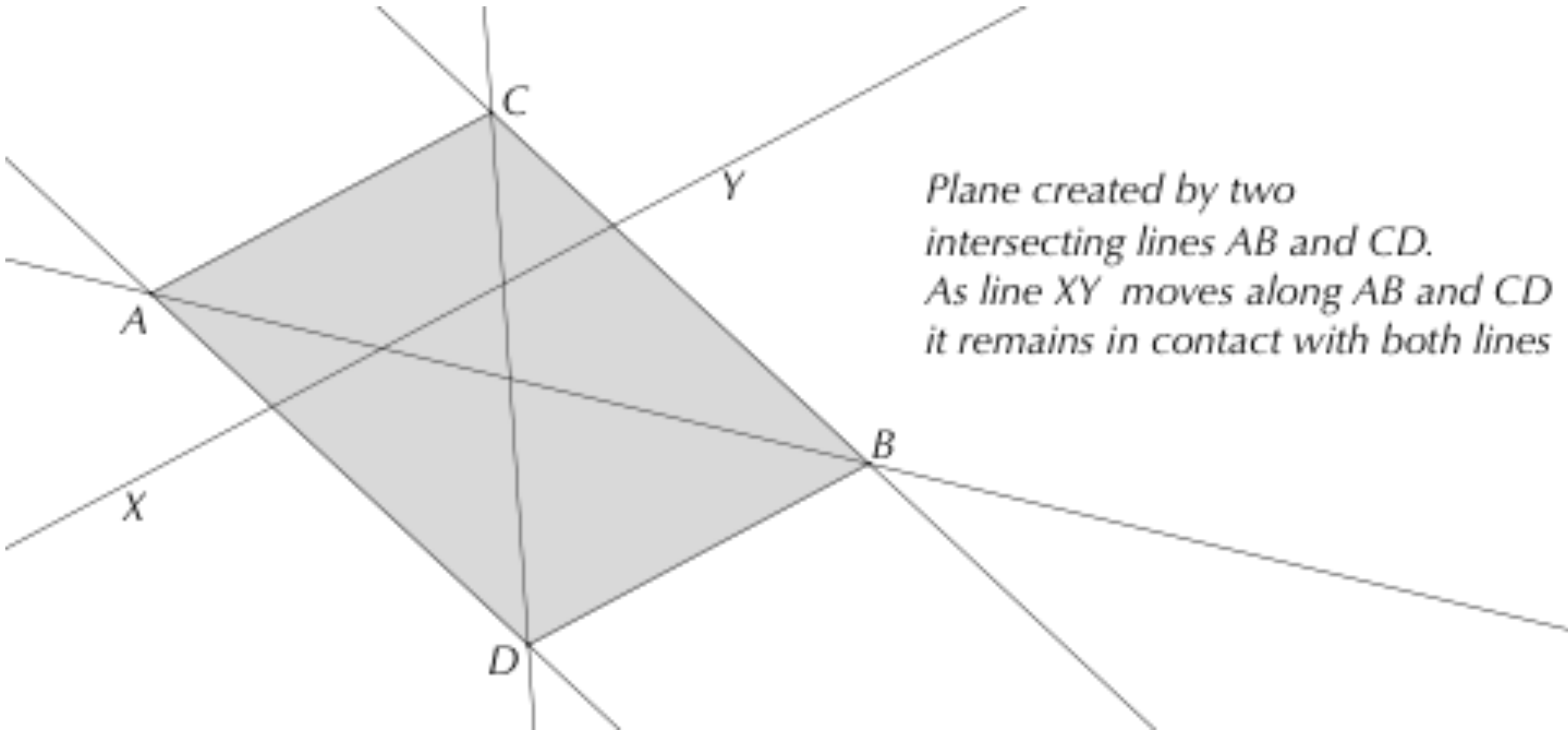


A *plane* is the set of all points that lie on any line specified by two points one from each two intersecting lines.


Line moving parallel to
itself will generate a plane

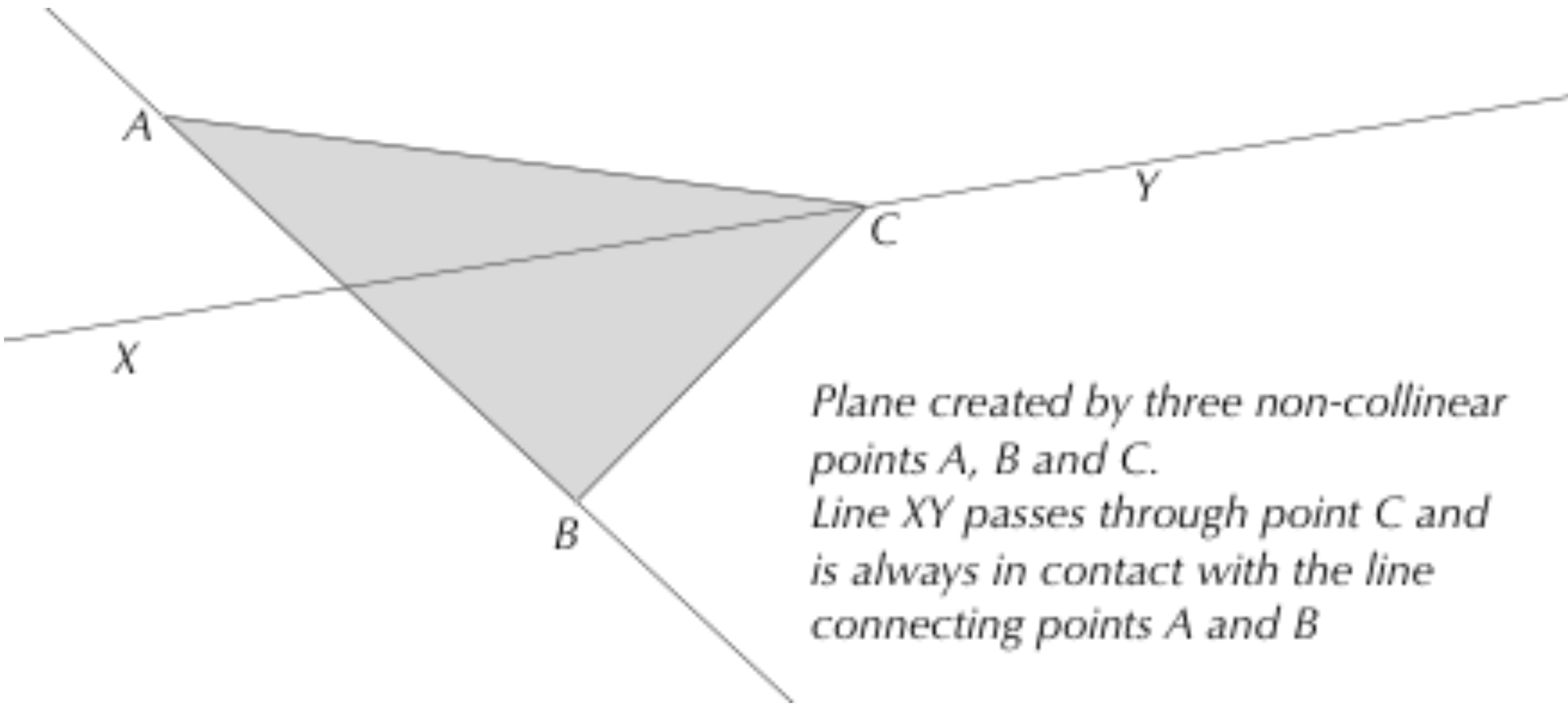

Line rotated about a point
form a sector of a plane circle

By two intersecting lines



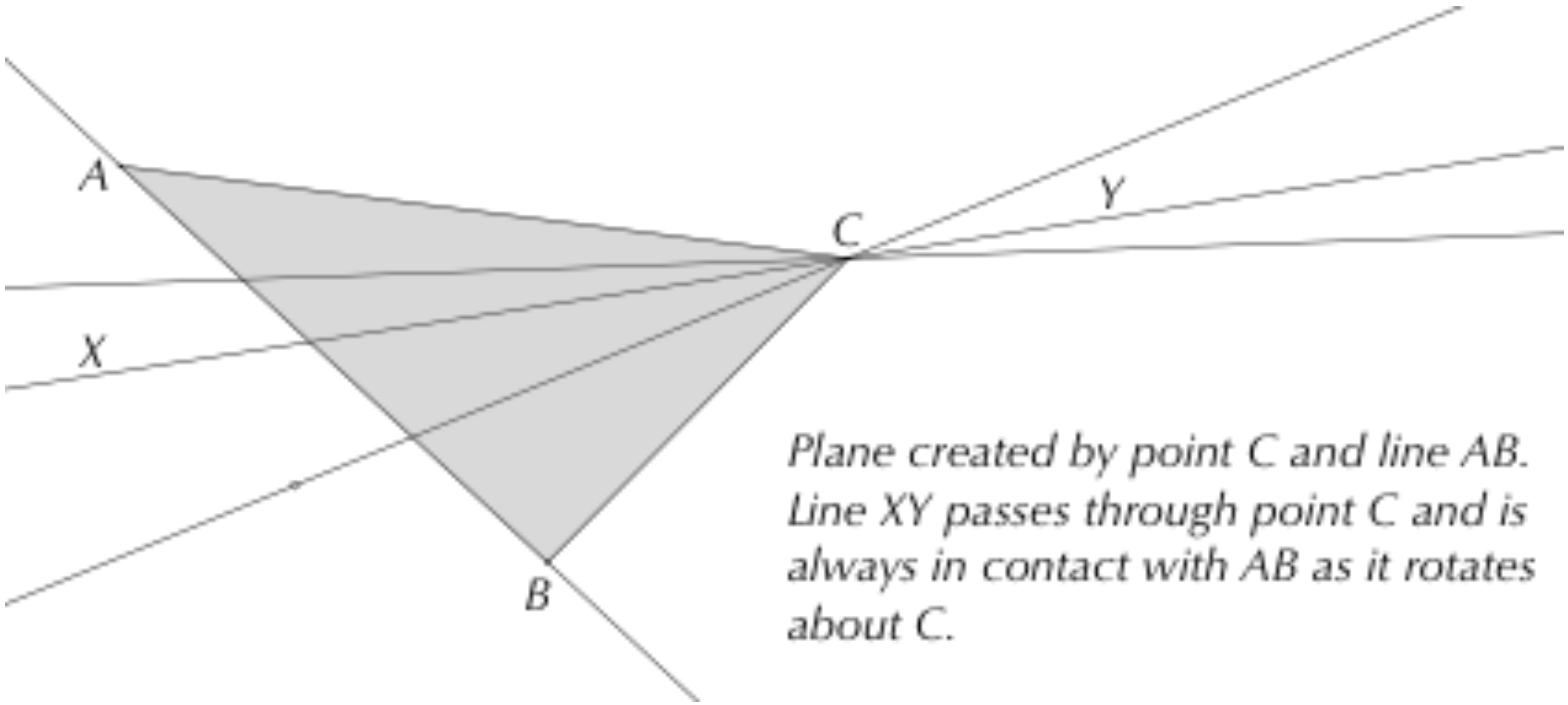
Plane created by two intersecting lines AB and CD. As line XY moves along AB and CD it remains in contact with both lines

By three non-collinear points



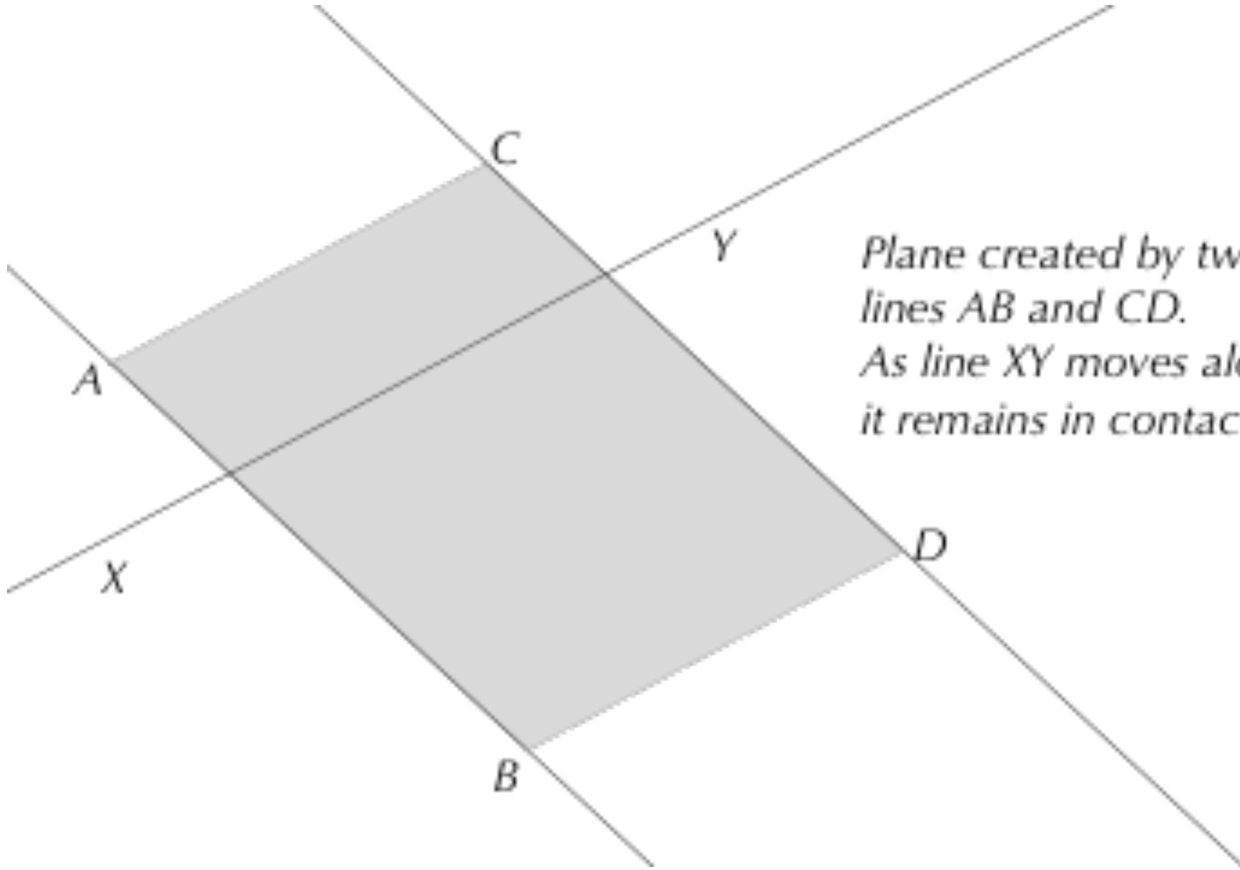
Plane created by three non-collinear points A, B and C.
Line XY passes through point C and is always in contact with the line connecting points A and B

By a line and a point off the line



Plane created by point C and line AB. Line XY passes through point C and is always in contact with AB as it rotates about C.

By two parallel lines

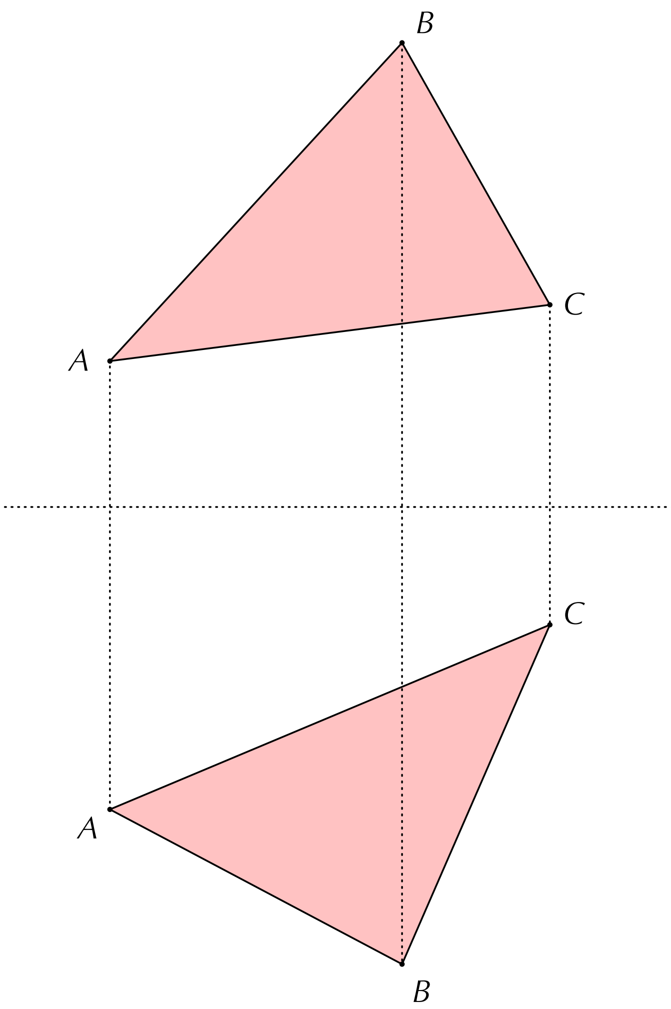


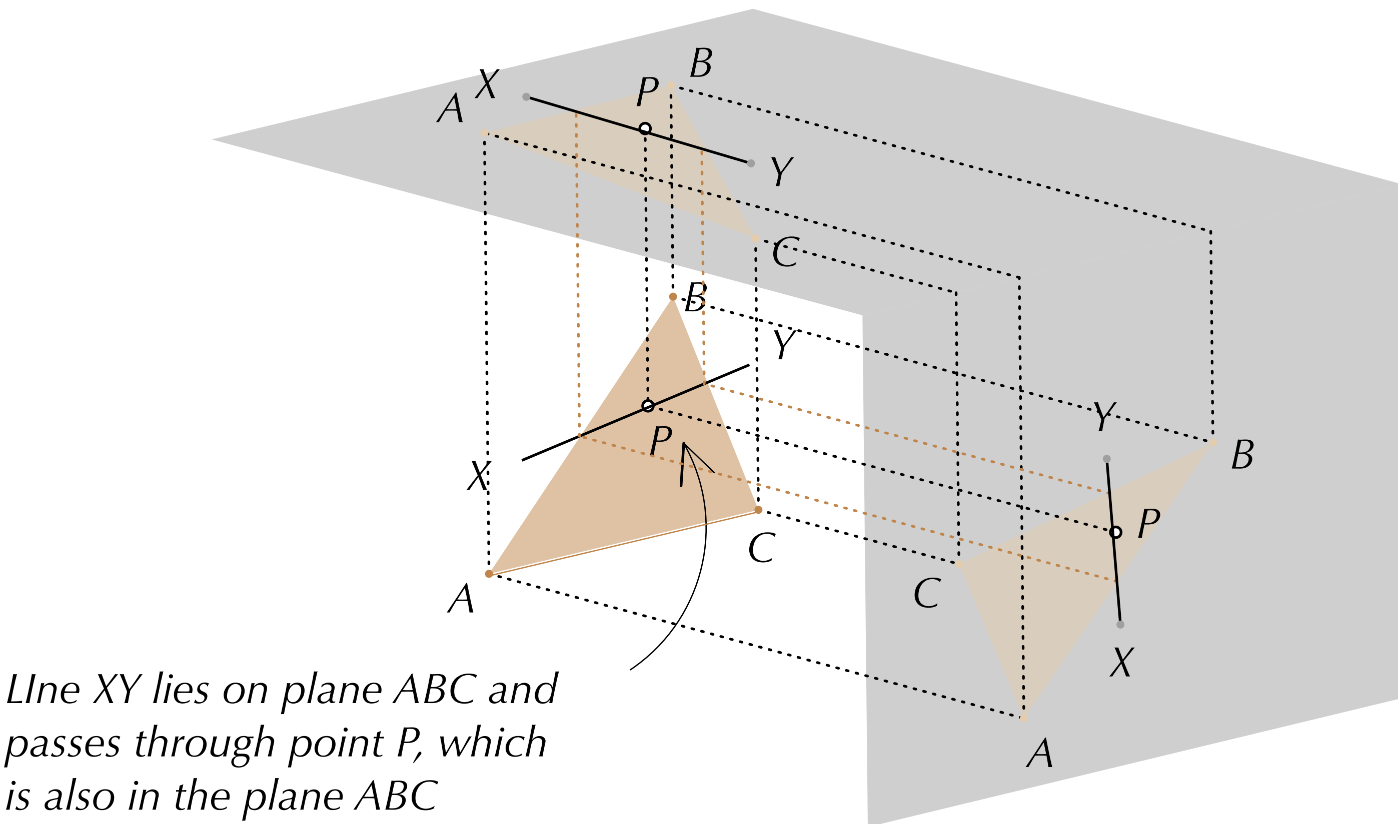
Plane created by two parallel lines AB and CD.
As line XY moves along AB and CD, it remains in contact with both lines

Planes are always depicted to have **limited size**

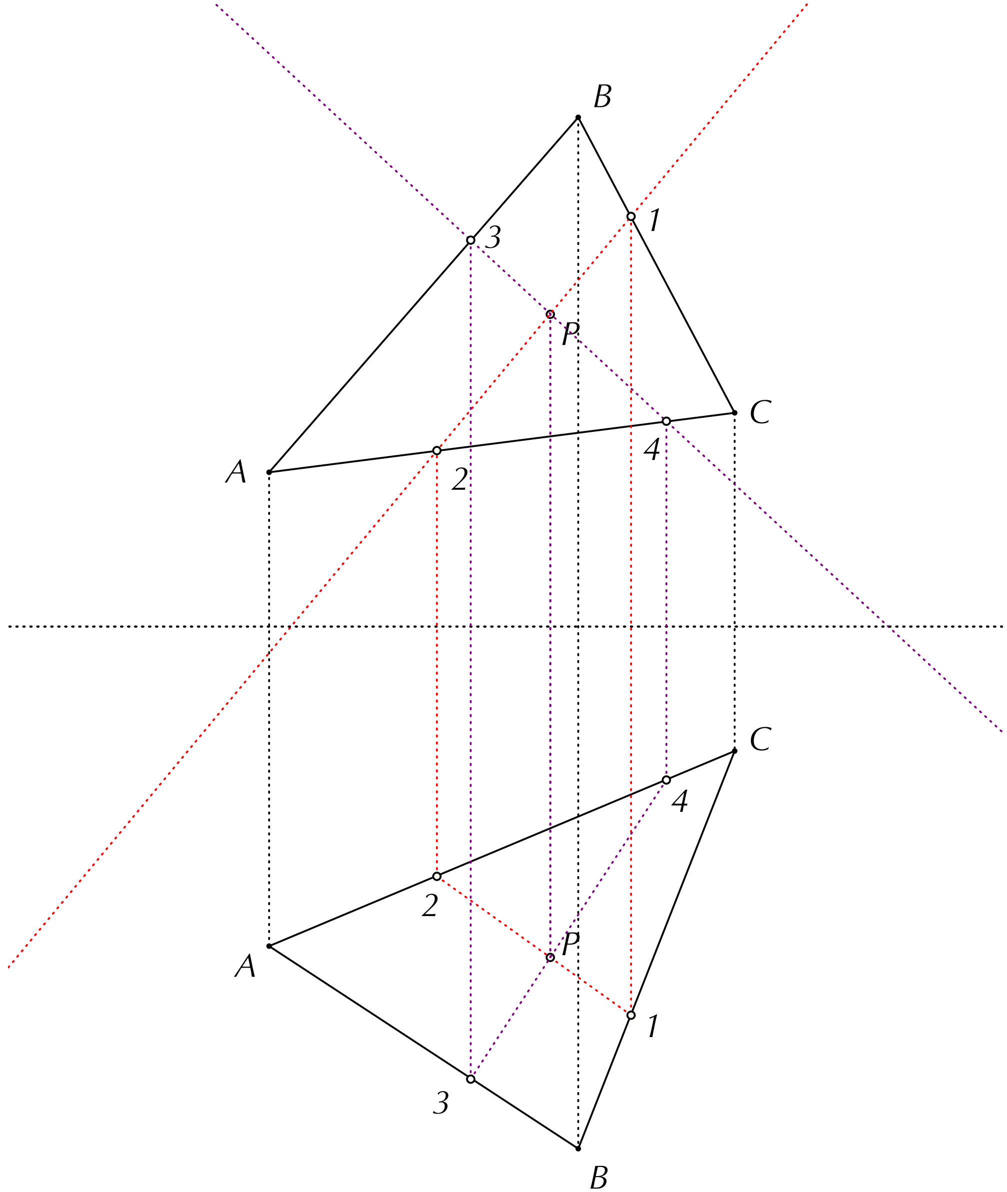
A plane is **completely and uniquely** defined by **three non-collinear points** on the plane;

That is, we can delineate **a** bounded portion of the **plane** by points that form the corners of a triangle which belong to the plane



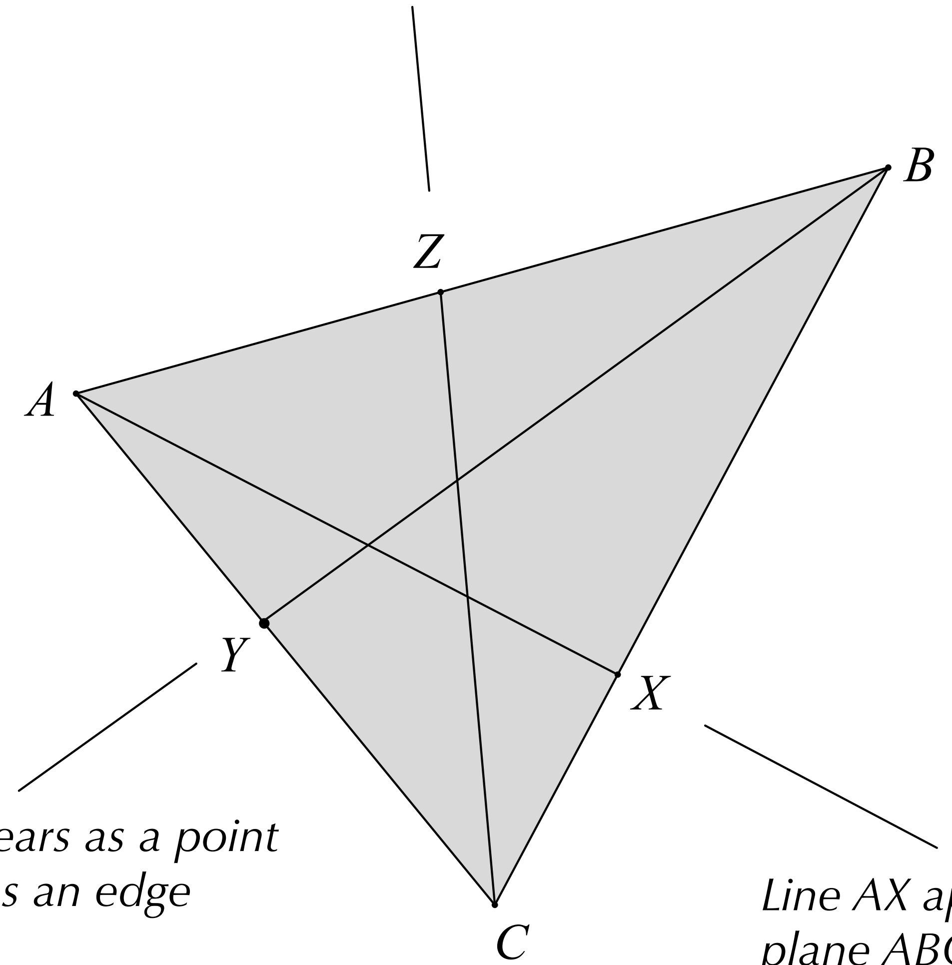


where is the point?



- where is the point?

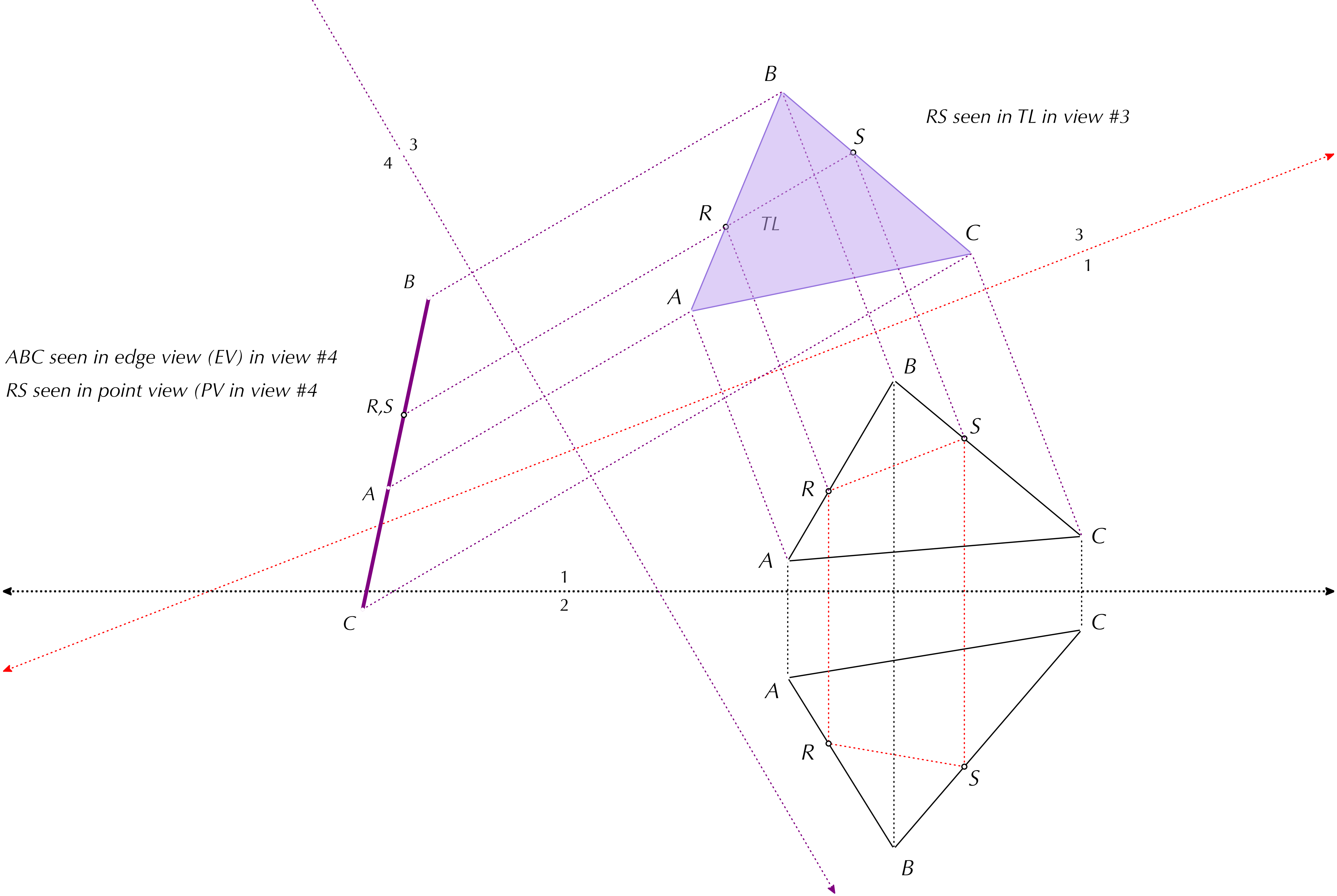
Line CZ appears as a point
plane ABC as an edge



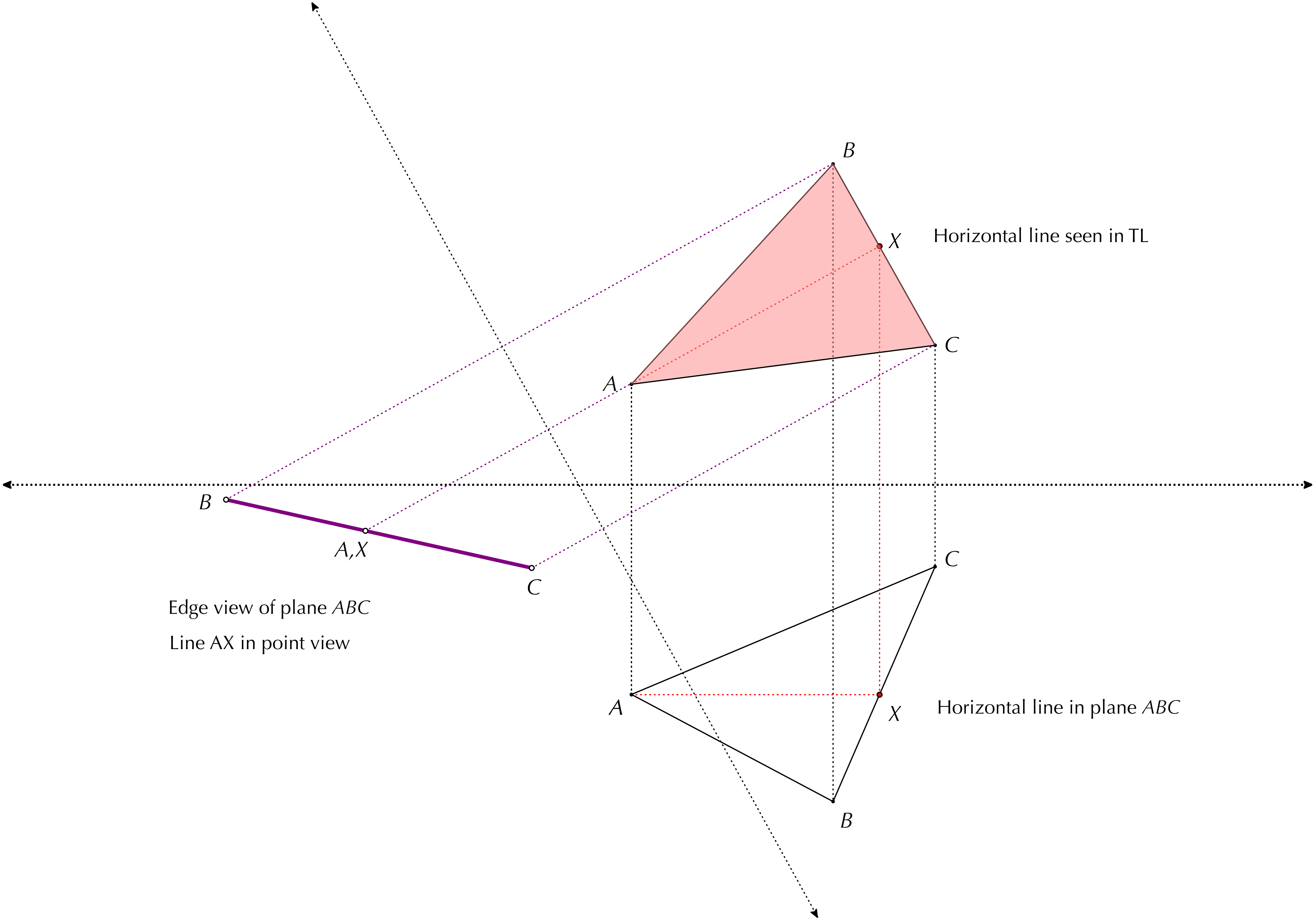
Line BY appears as a point
plane ABC as an edge

Line AX appears as a point
plane ABC as an edge

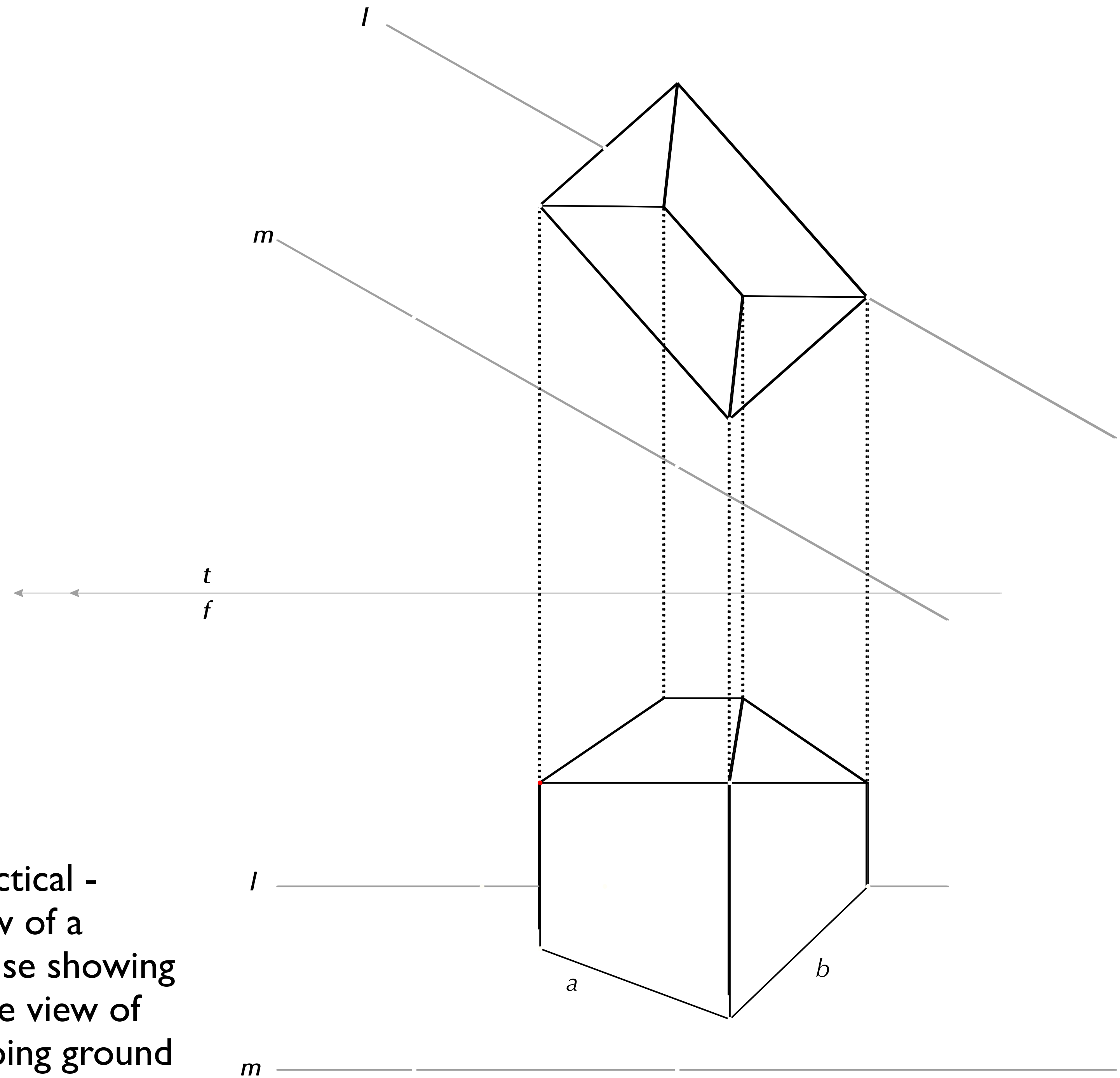
edge view of a plane



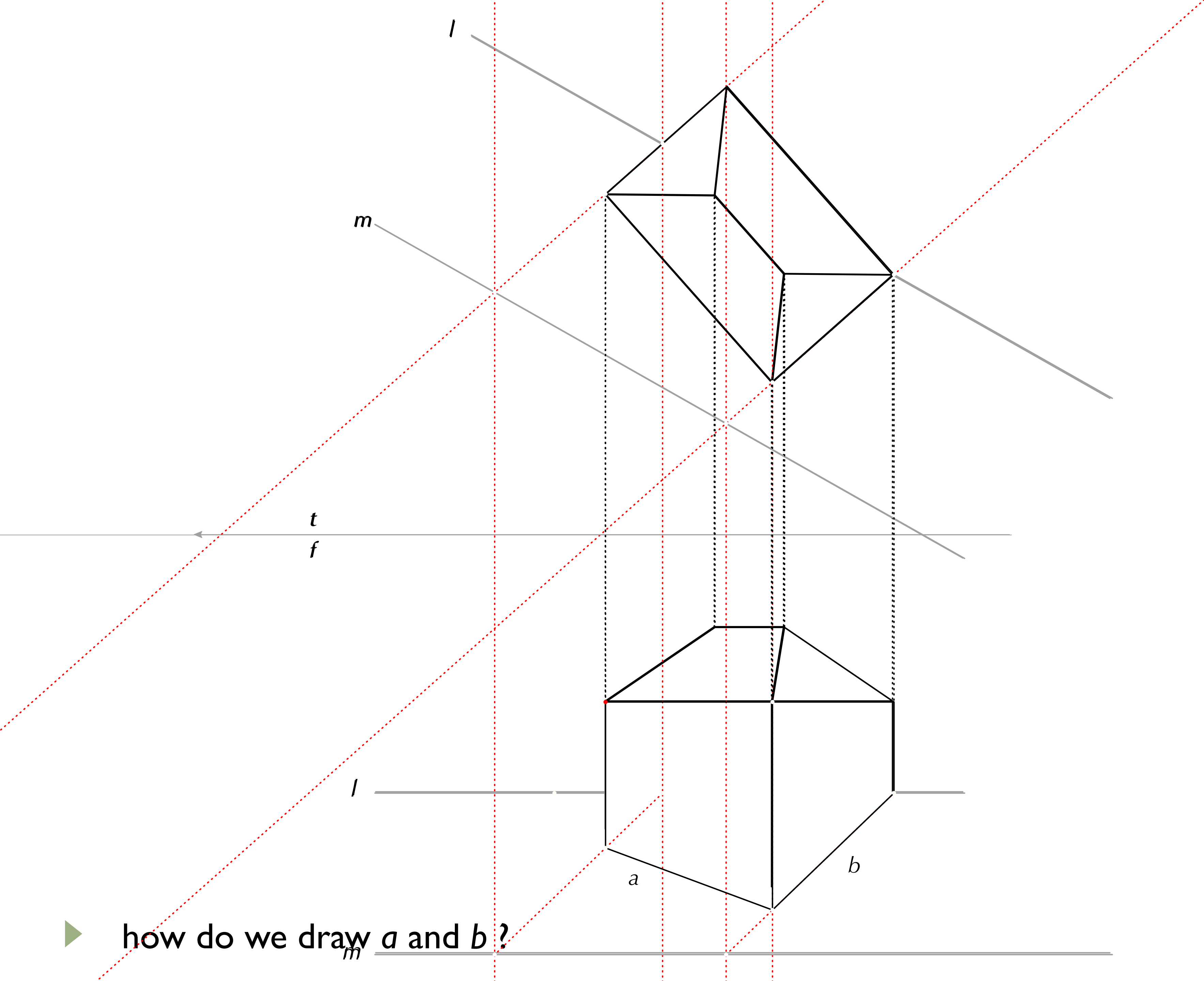
edge view of a plane



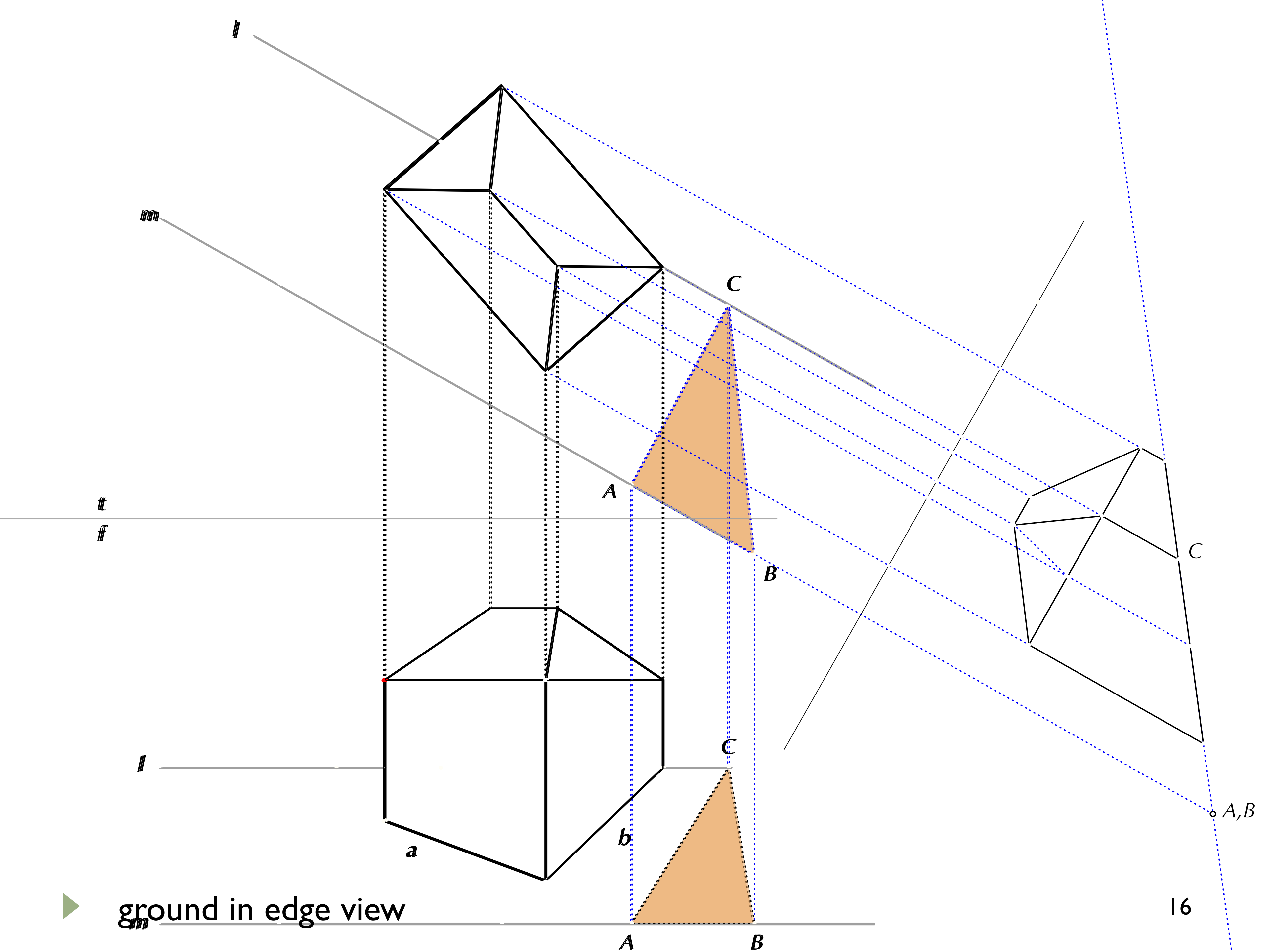
edge view of a plane



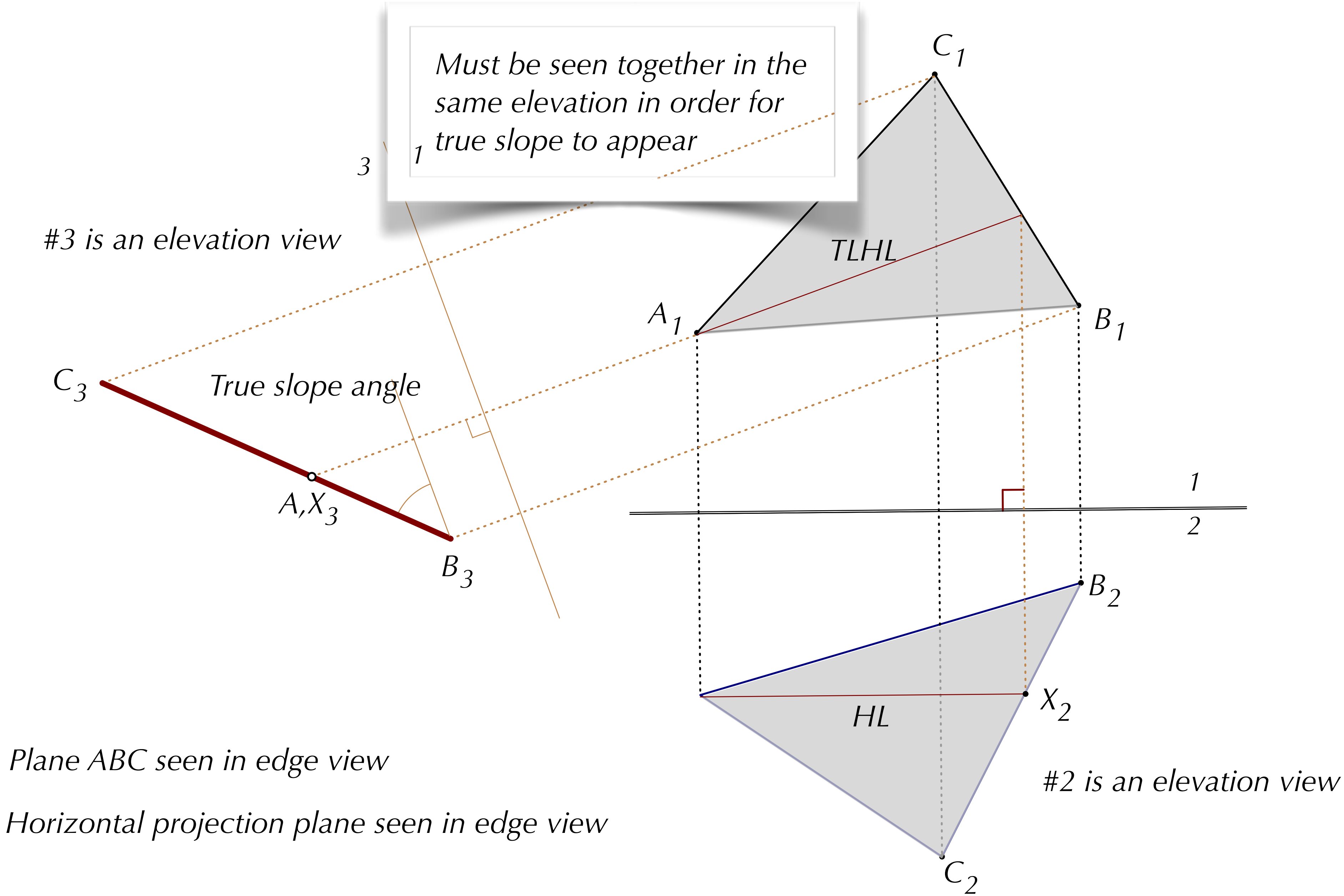
practical -
view of a
house showing
edge view of
sloping ground



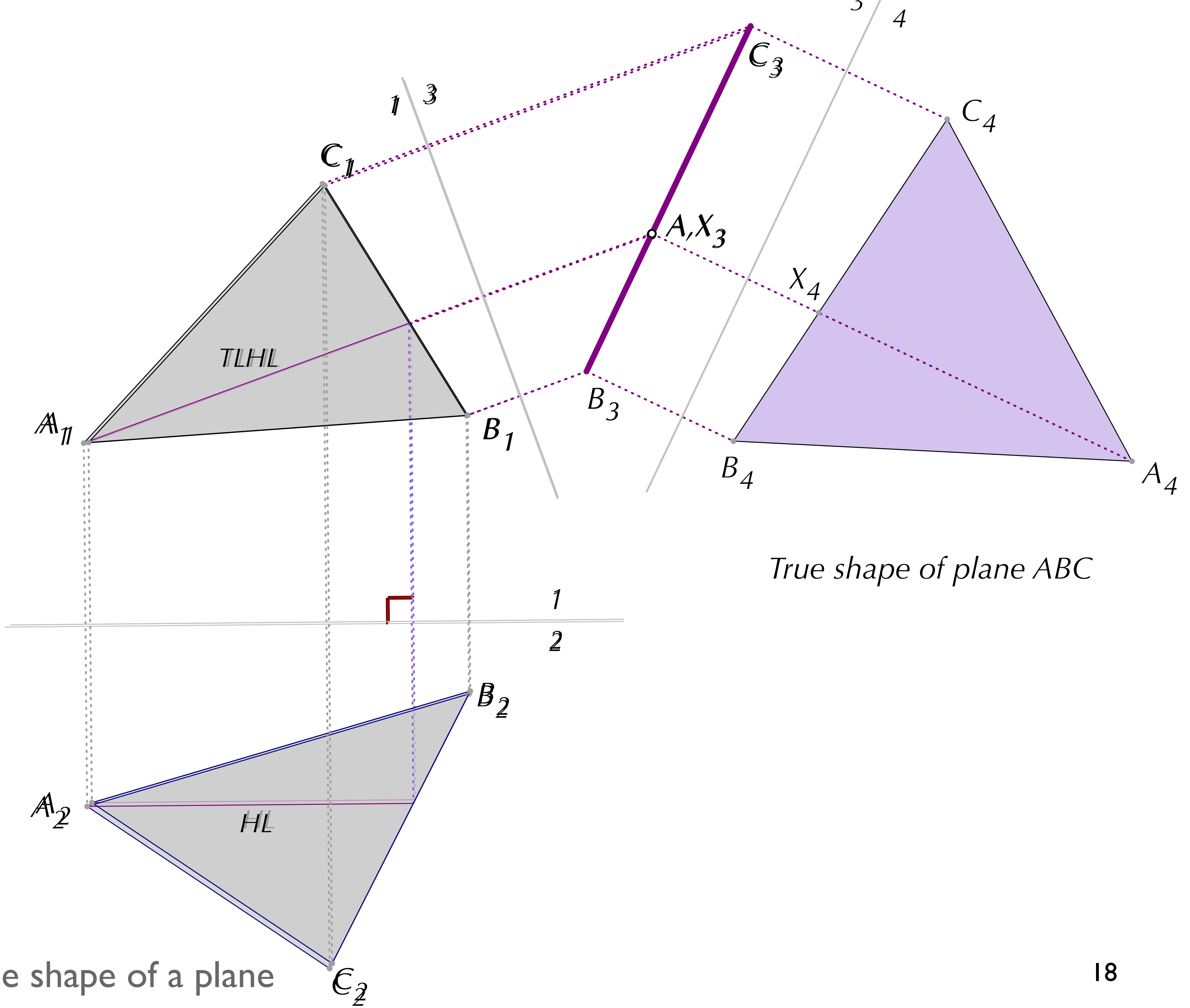
- how do we draw *a* and *b* ?



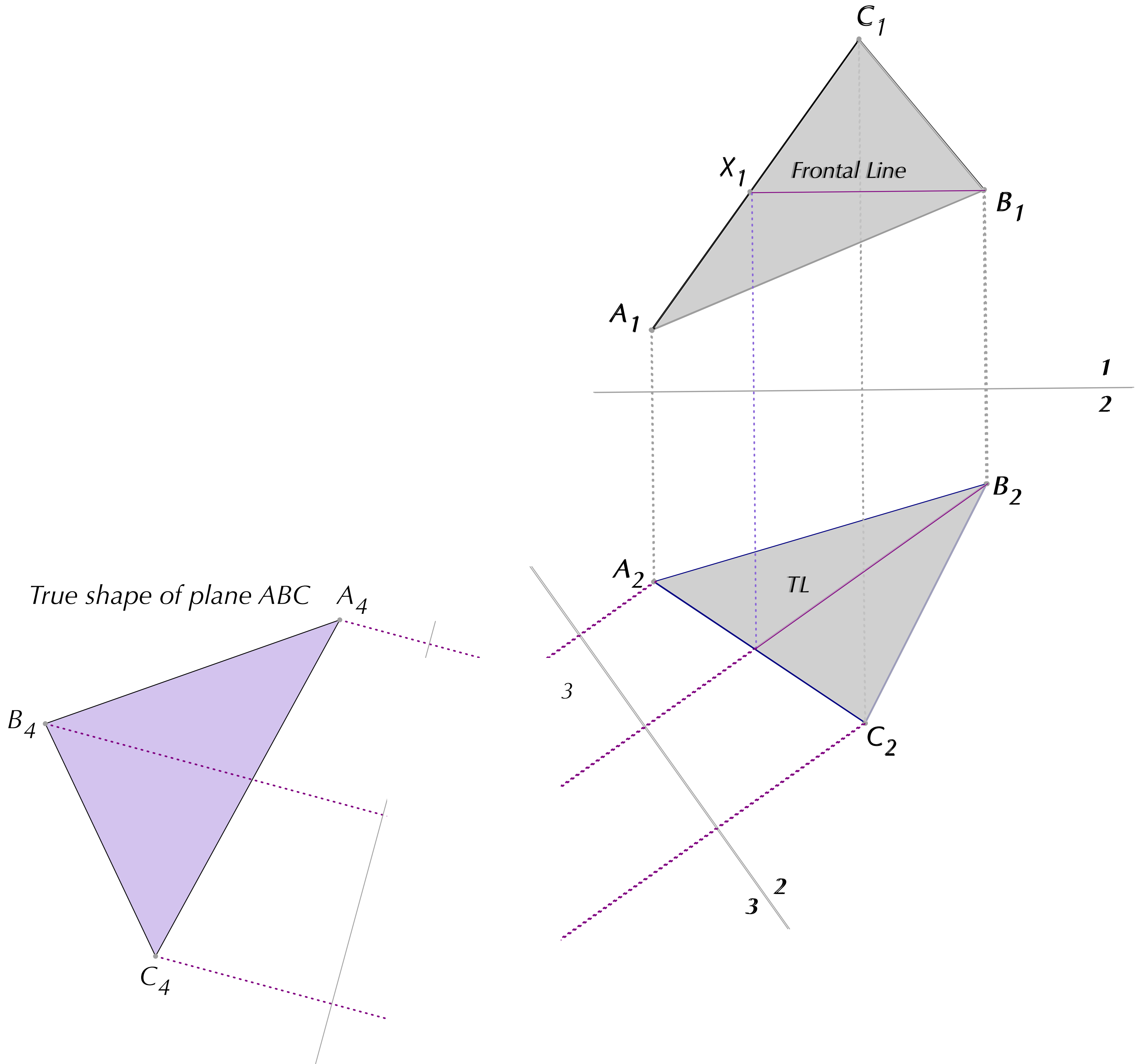
- ground in edge view



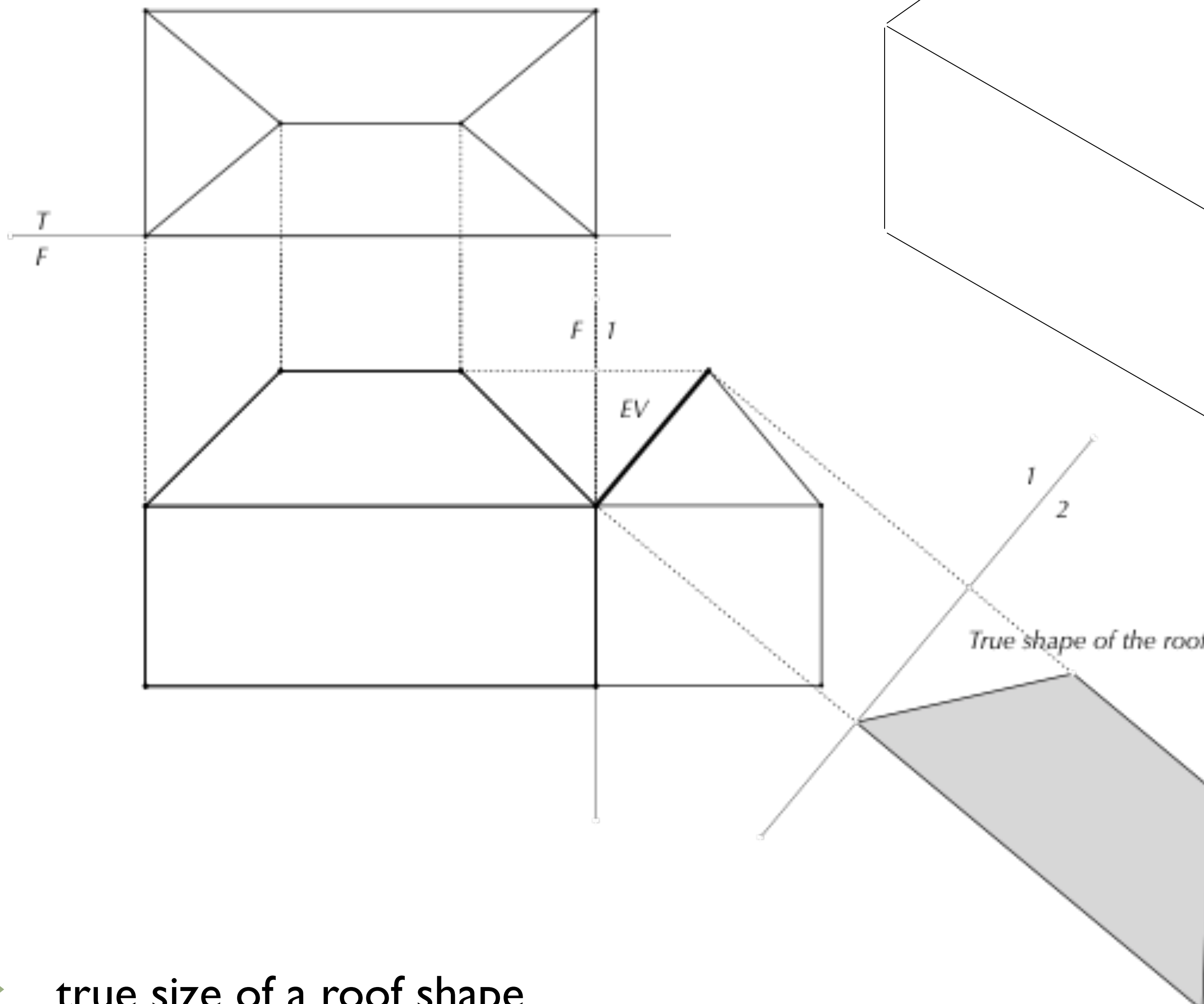
- true slope of a plane – aka *dip* of the plane

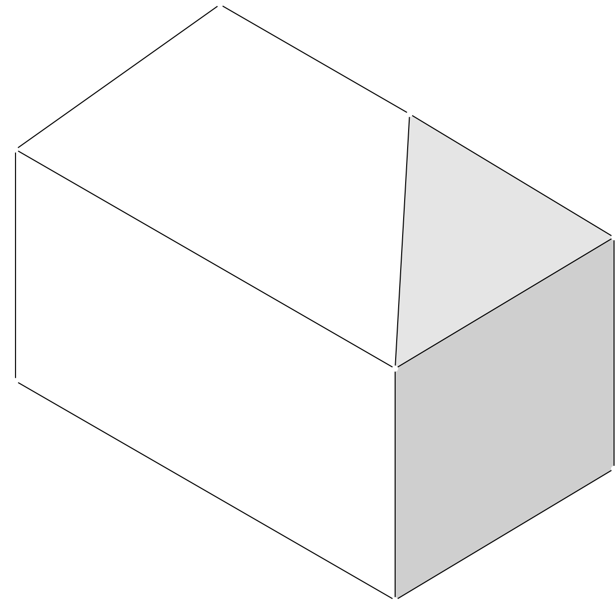


- true shape of a plane

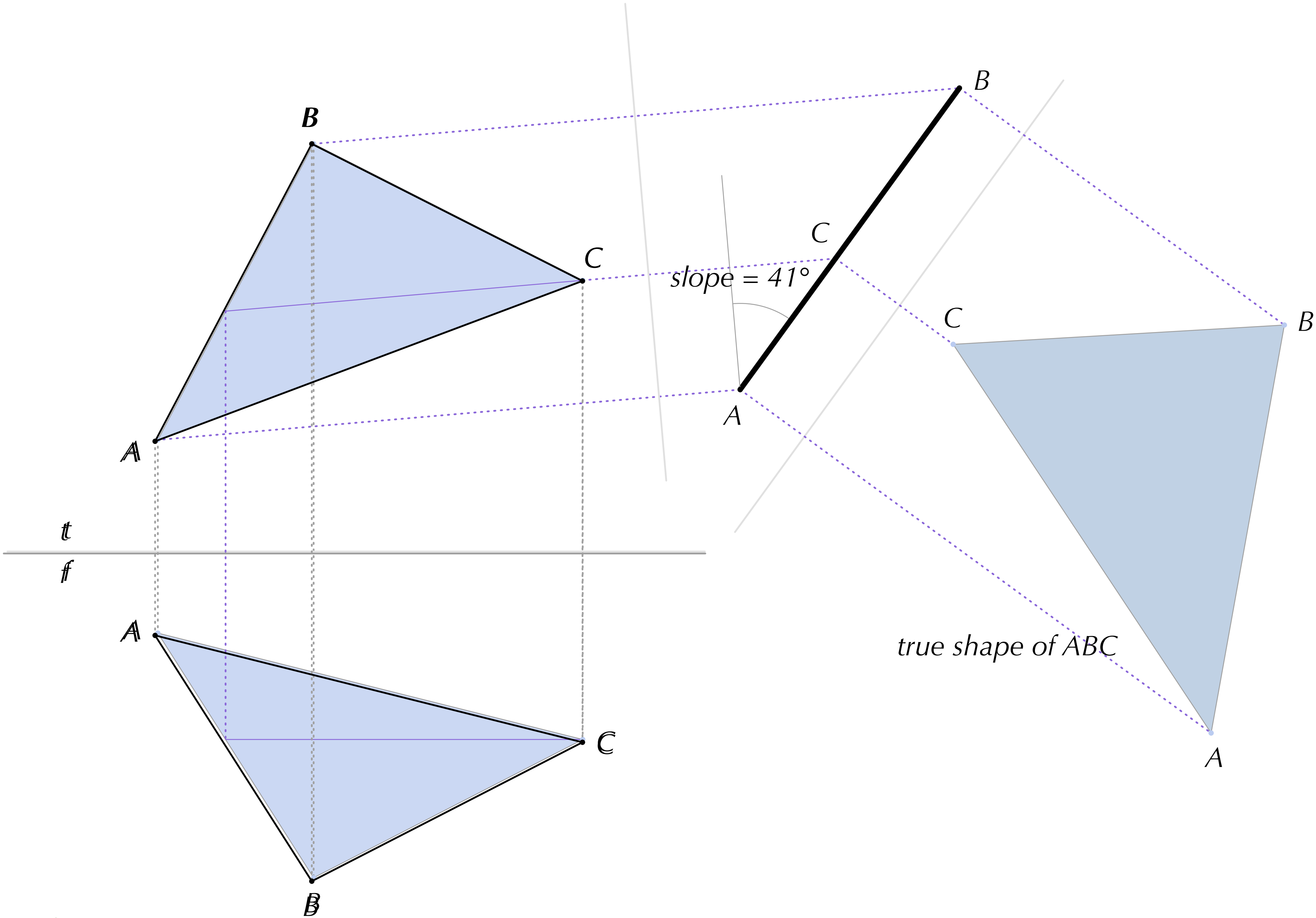


C1
X1
Frontal Line
B1
A1
1
2
B2
A2
TL
True shape of plane ABC
A4
B4
3
C2
2
3
C4

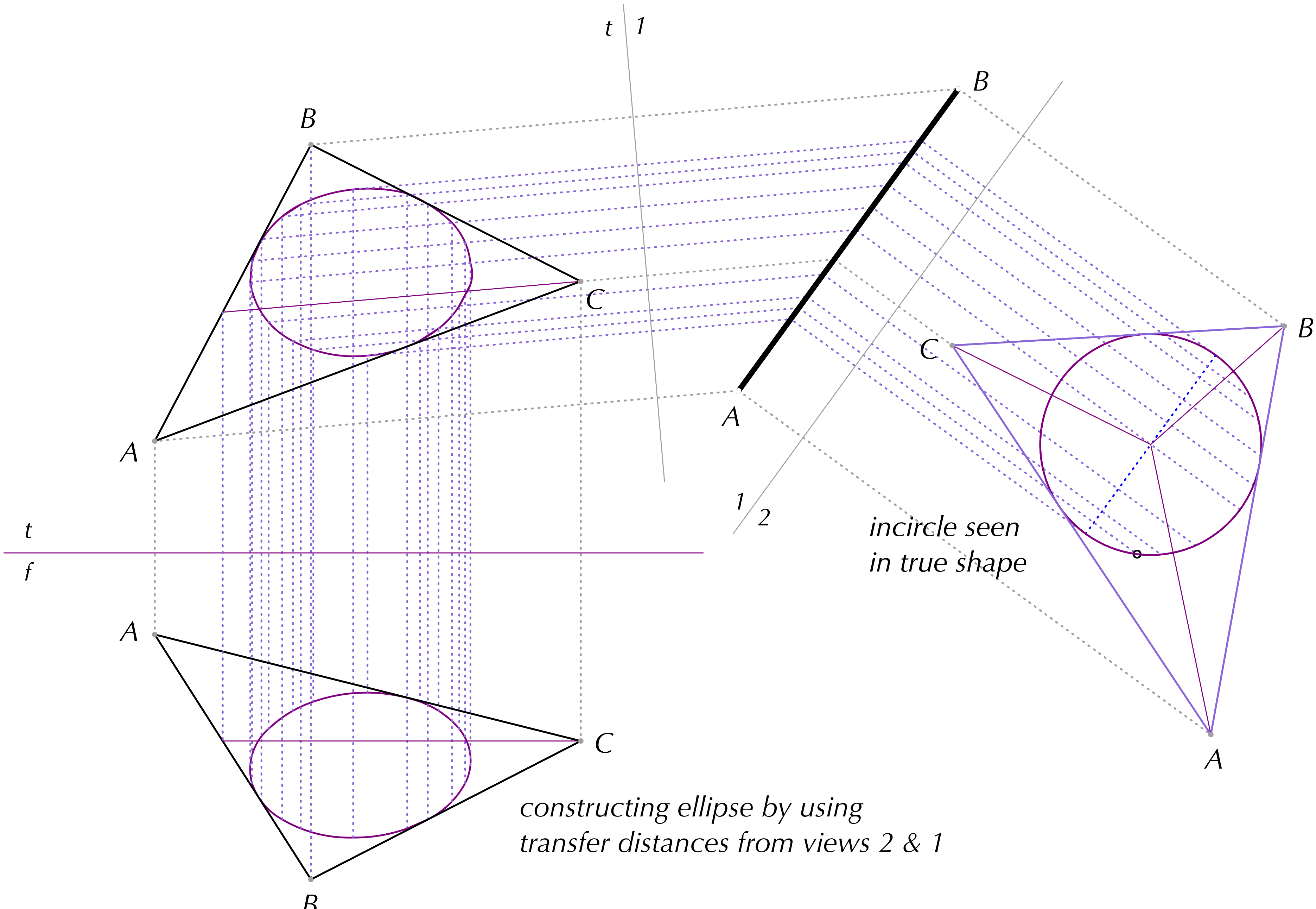




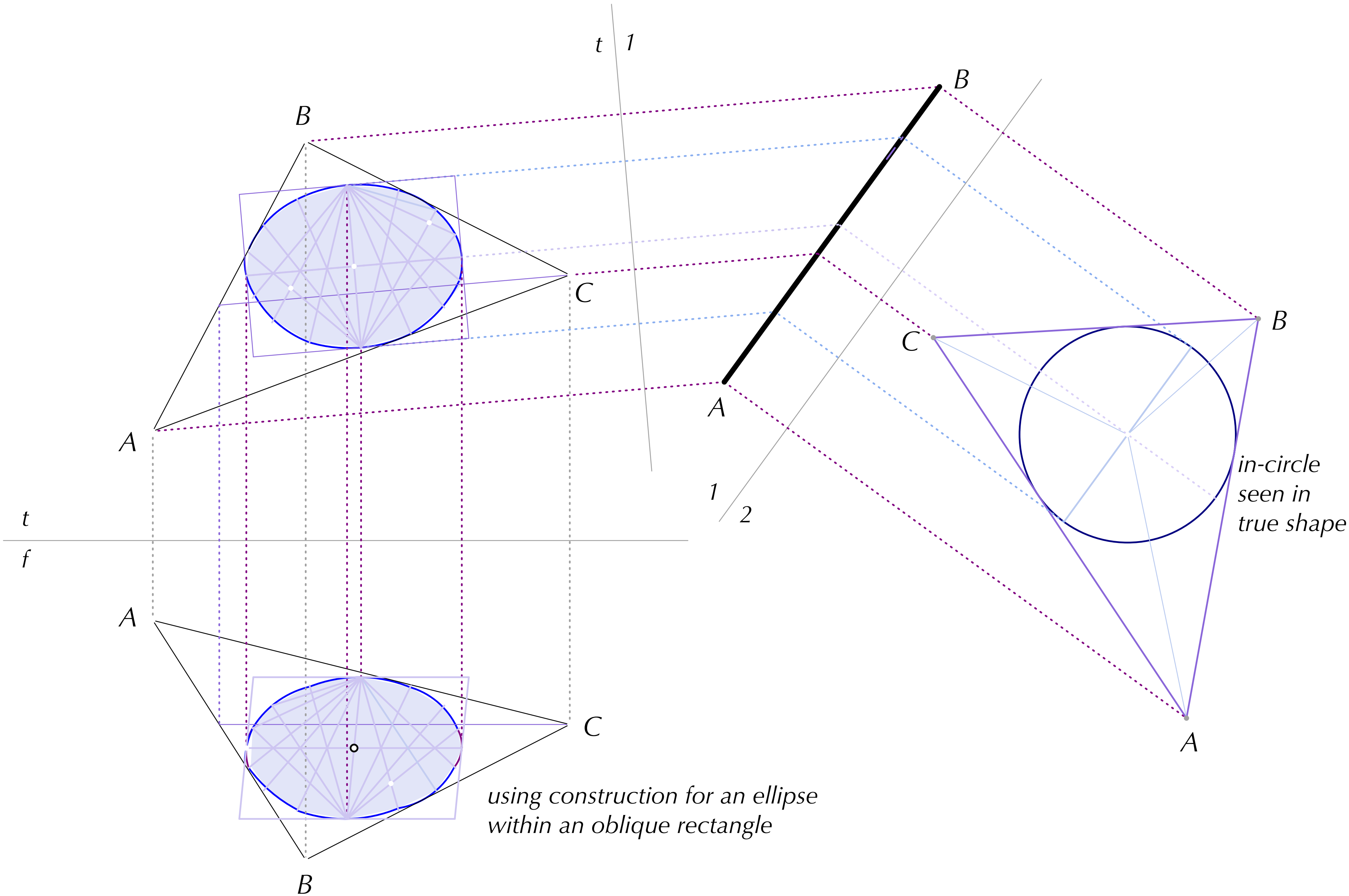
- true size of a roof shape



- inscribing a circle in a triangle



incircle - last step (variation 1)

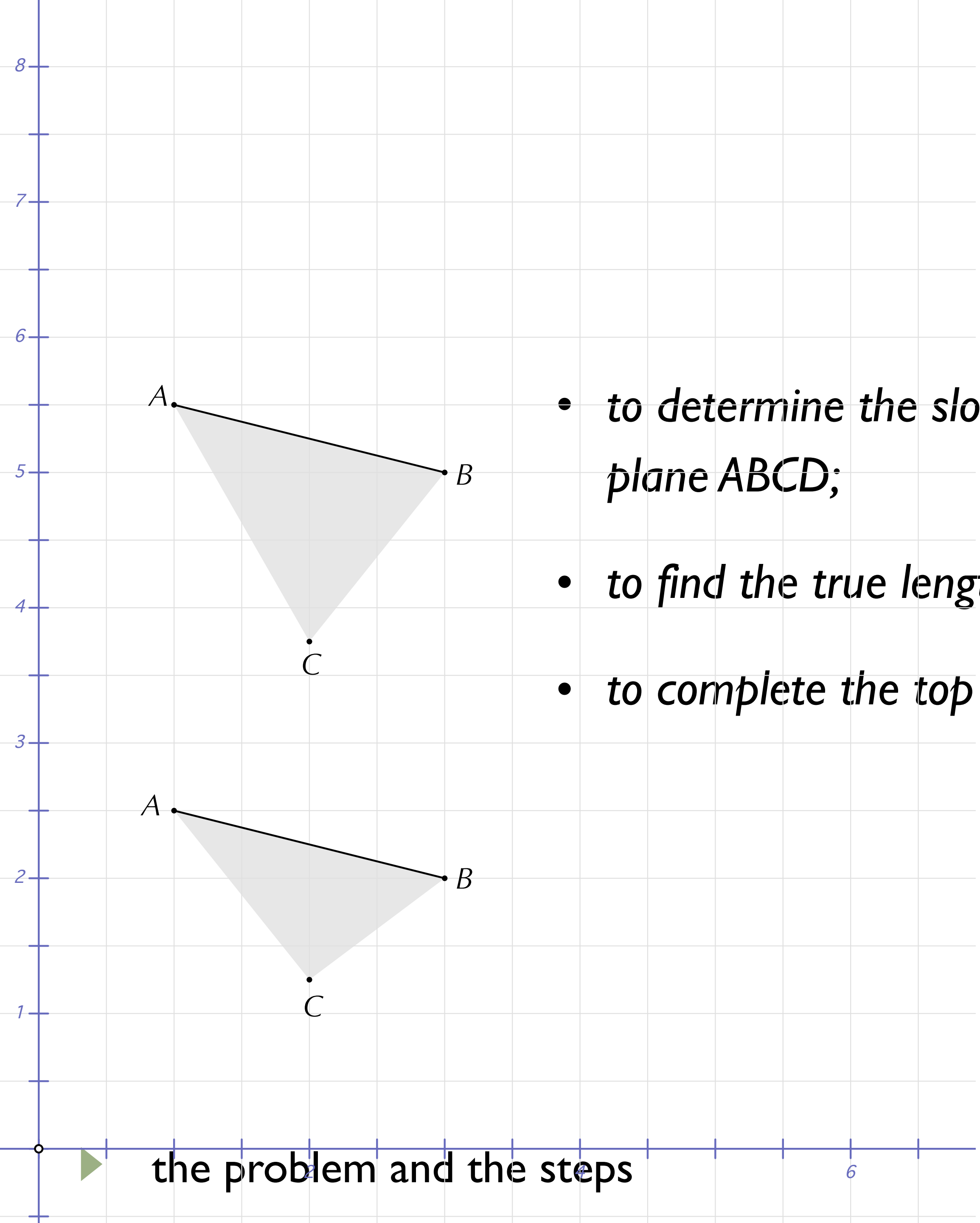


incircle - last step (variation 2)

Suppose a plane is given by diagonal lines, say *AB* and *CD*. Suppose three of the points, say *A*, *B* and *C* are given by their quad paper coordinates, for example, A (1, 2½, 5½), B (3, 2, 5), and C (2, 1¼, 3¾).

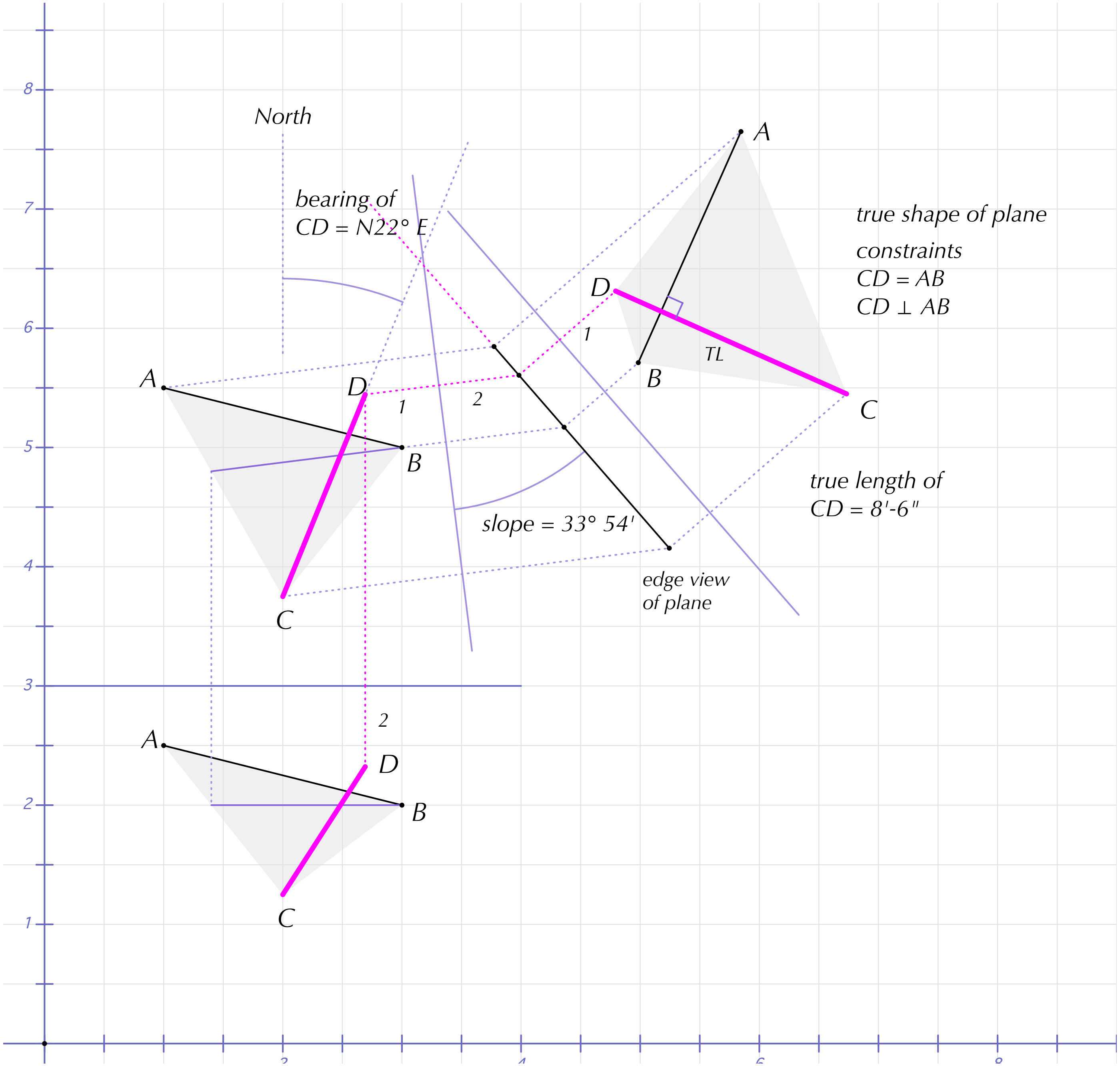
In order to determine *D* we will need further constraints. Suppose the diagonals are of equal length, that is, $AB = CD$; suppose further that they intersect at right angles.

to determine the ***slope*** *and* ***true shape*** *of the plane ABCD; to find the* ***true length and bearing*** *of CD; and to* ***complete the top and front views*** *of the plane*

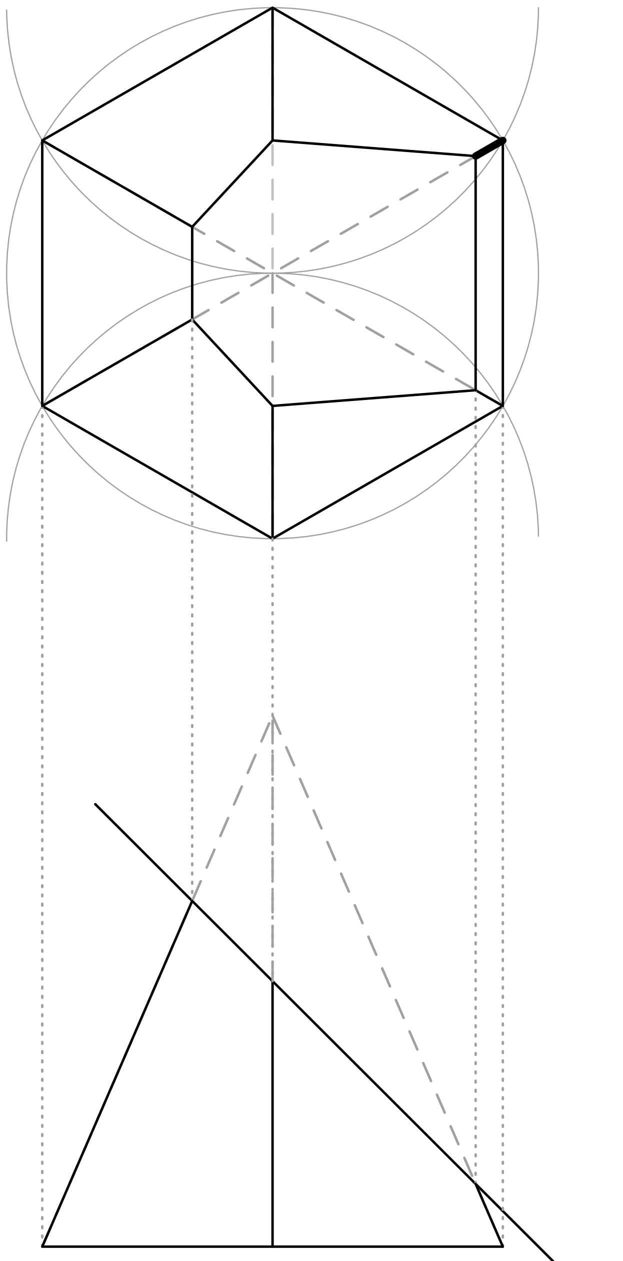


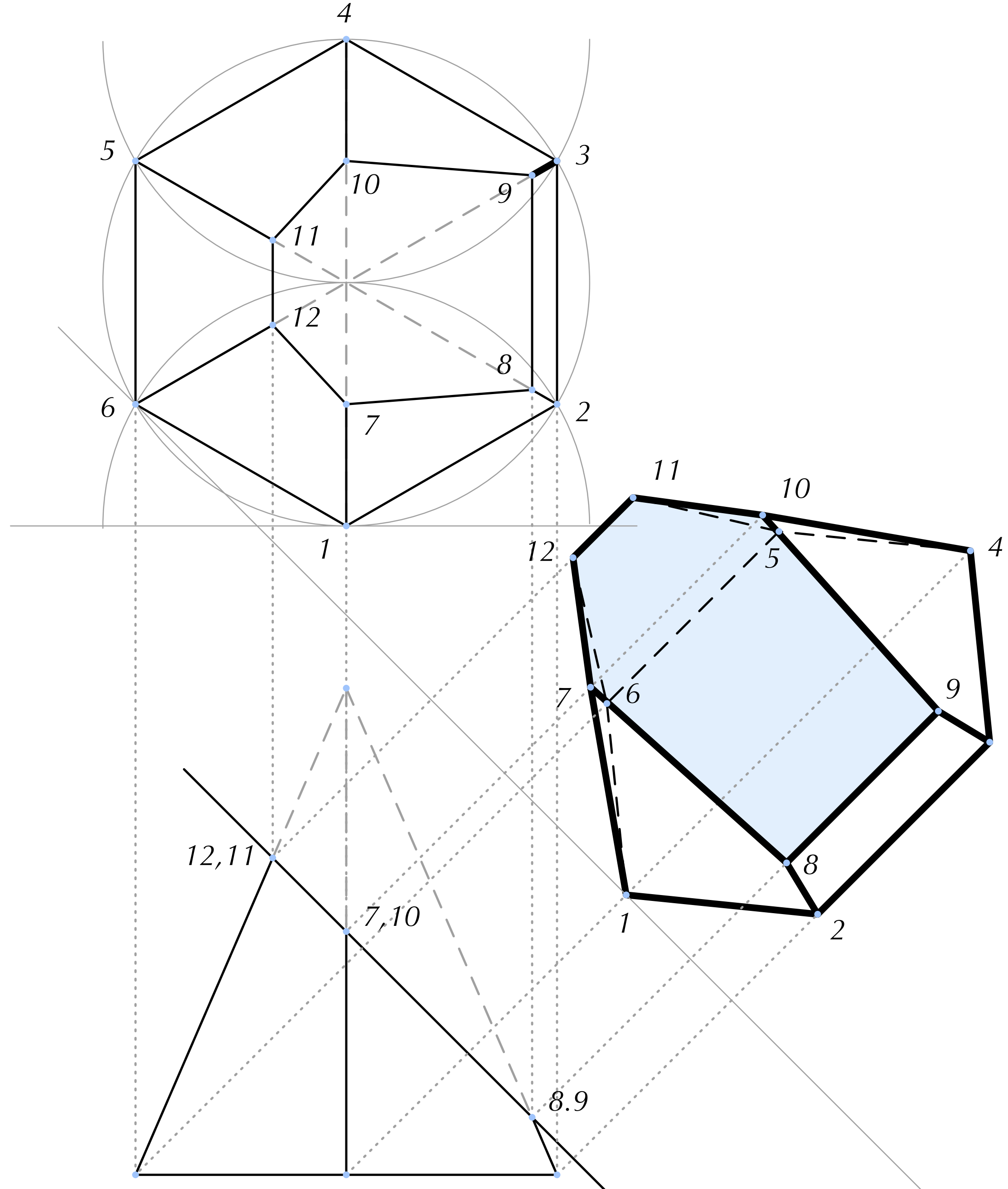
- *to determine the slope and true shape of the plane ABCD;*
- *to find the true length and bearing of CD;*
- *to complete the top and front views of the plane.*

the problem and the steps

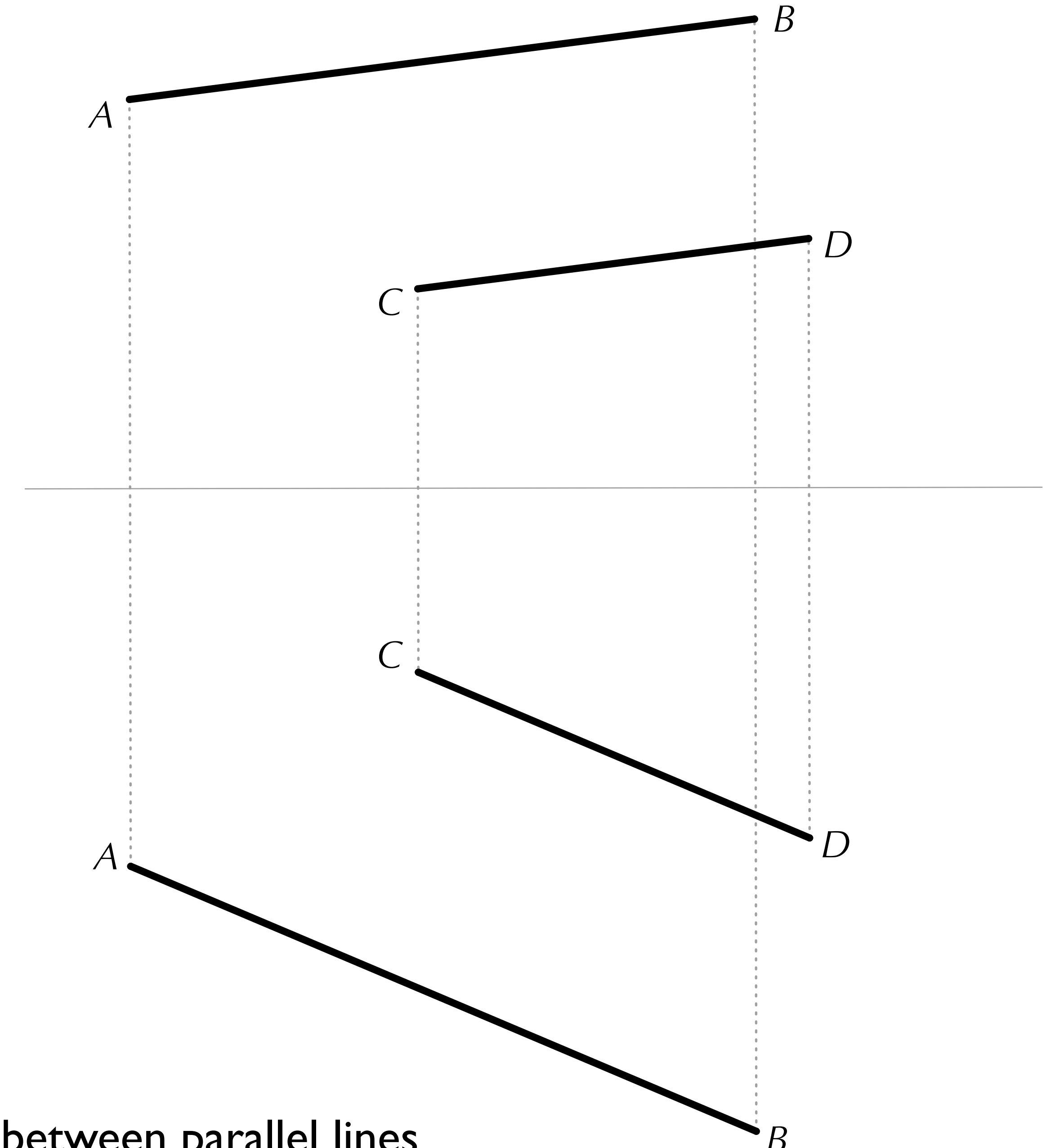


completing the views of a plane

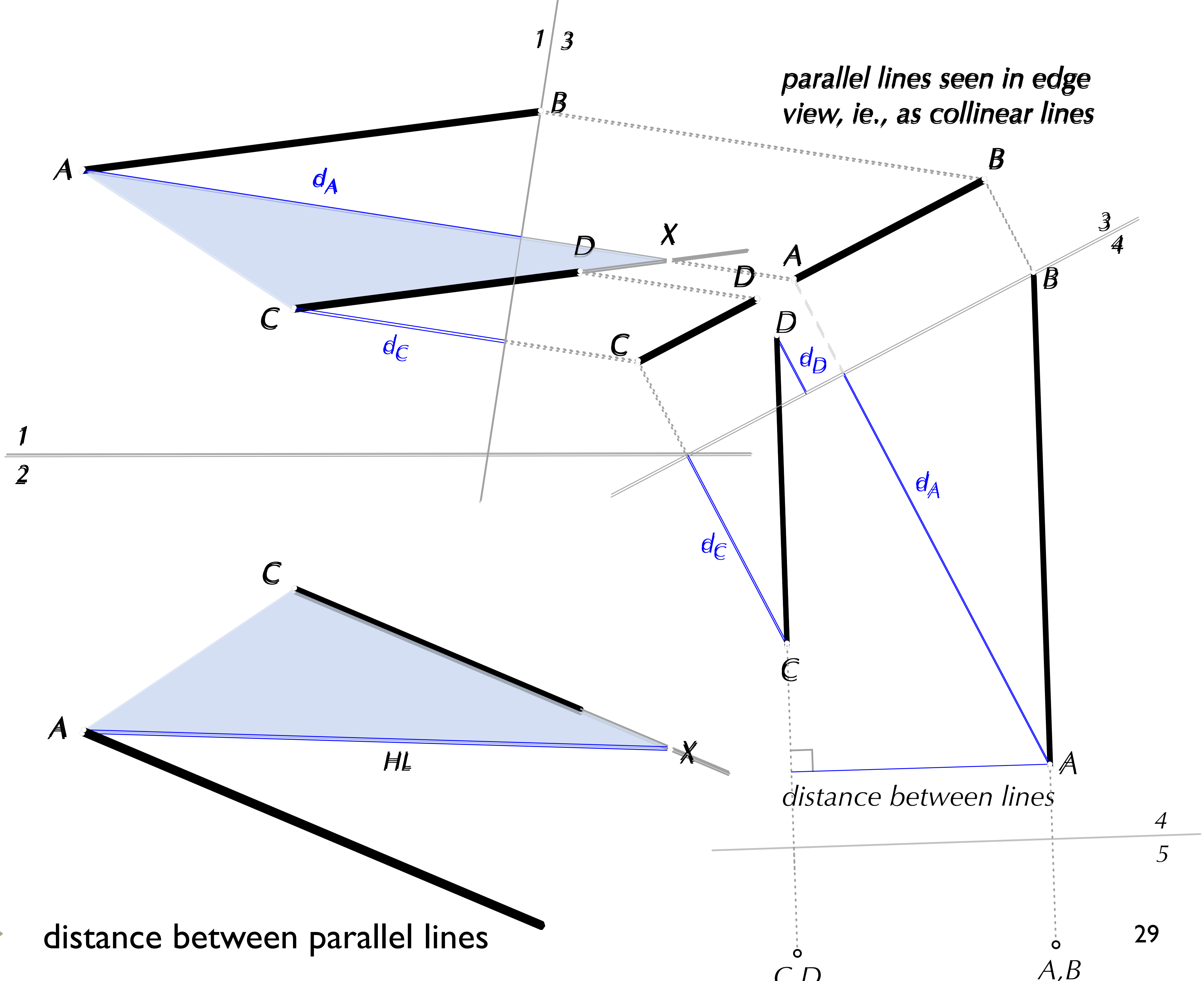




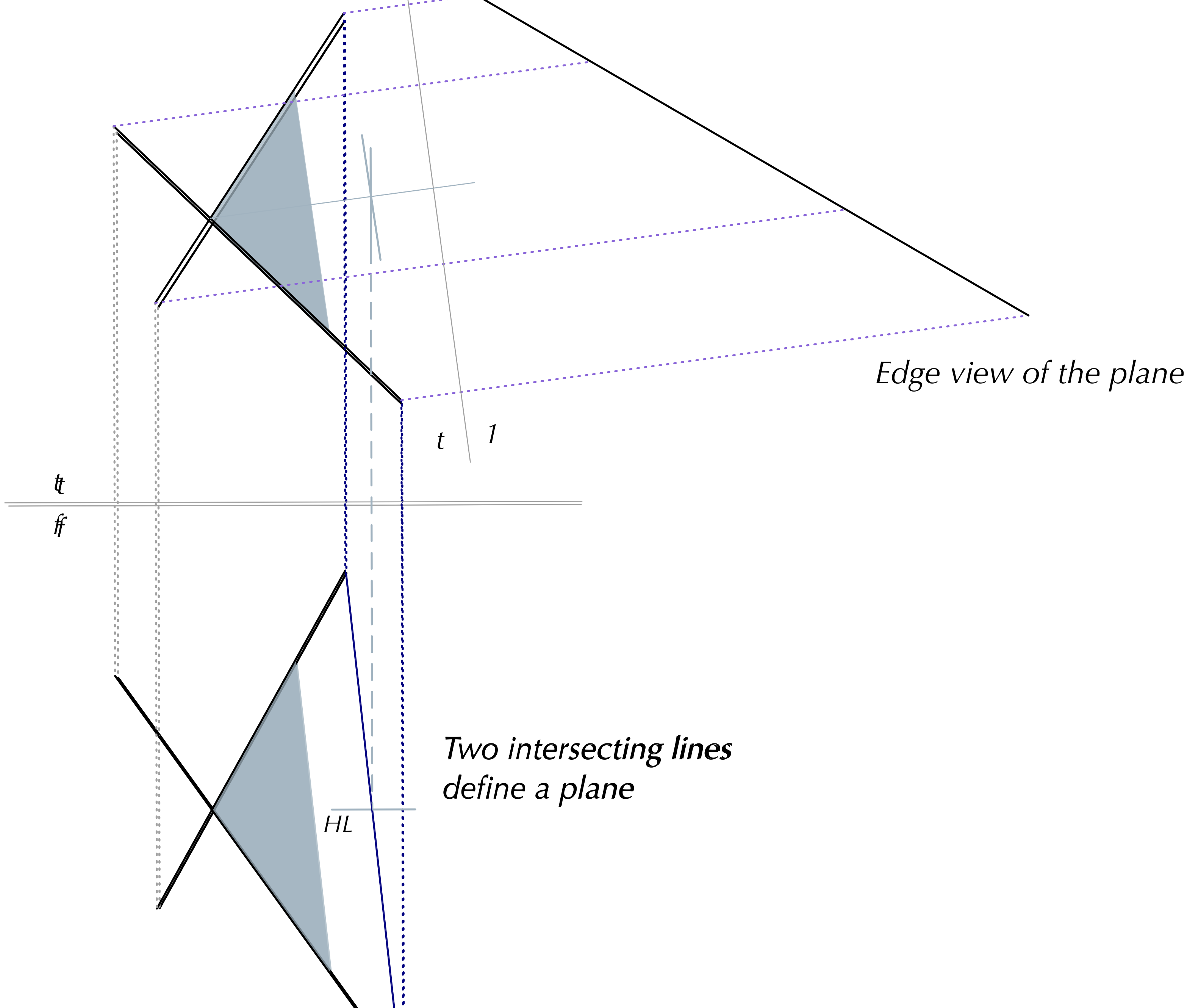
- true shape of a truncated face



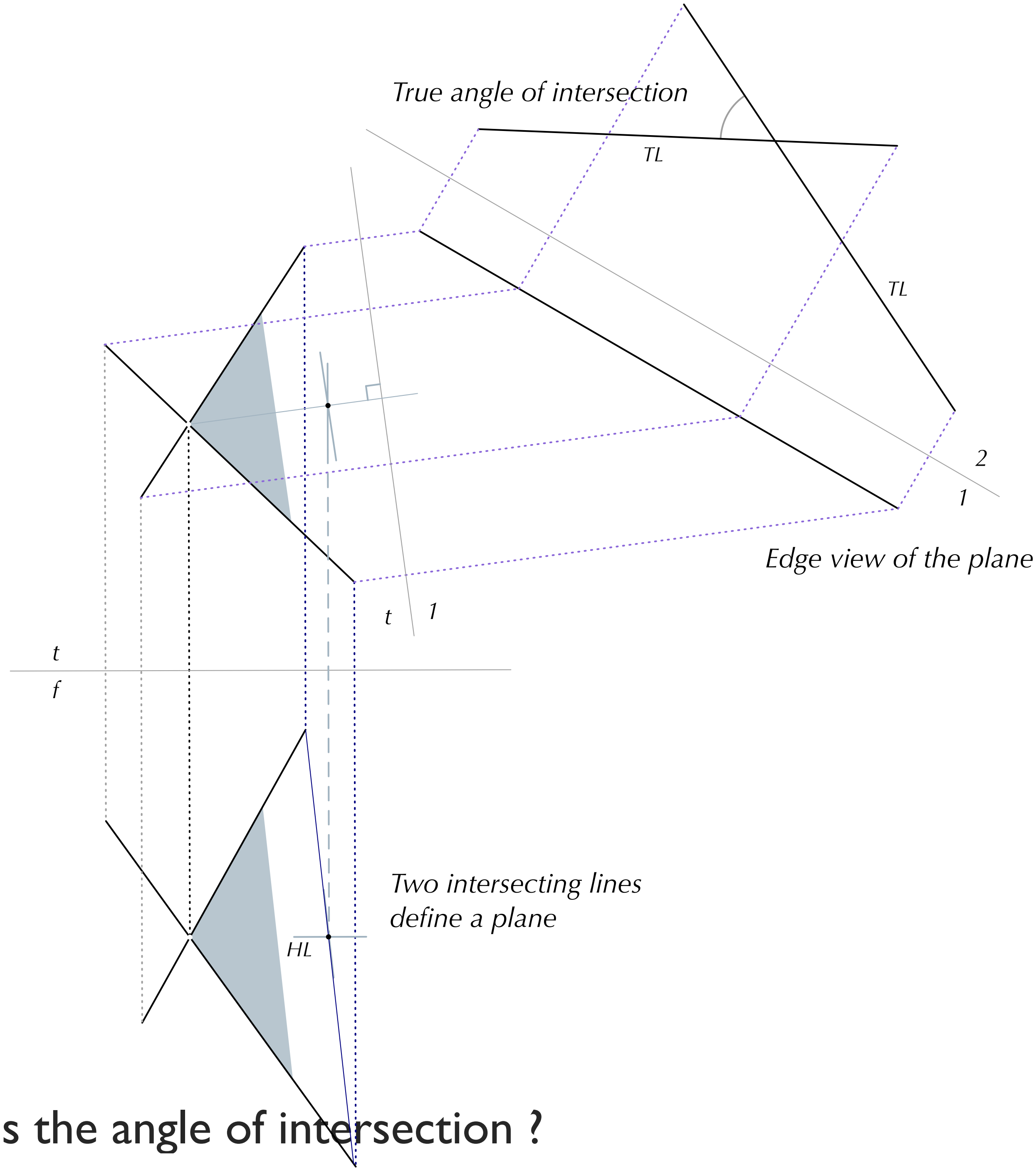
- distance between parallel lines



- distance between parallel lines



- what is the angle of intersection ?



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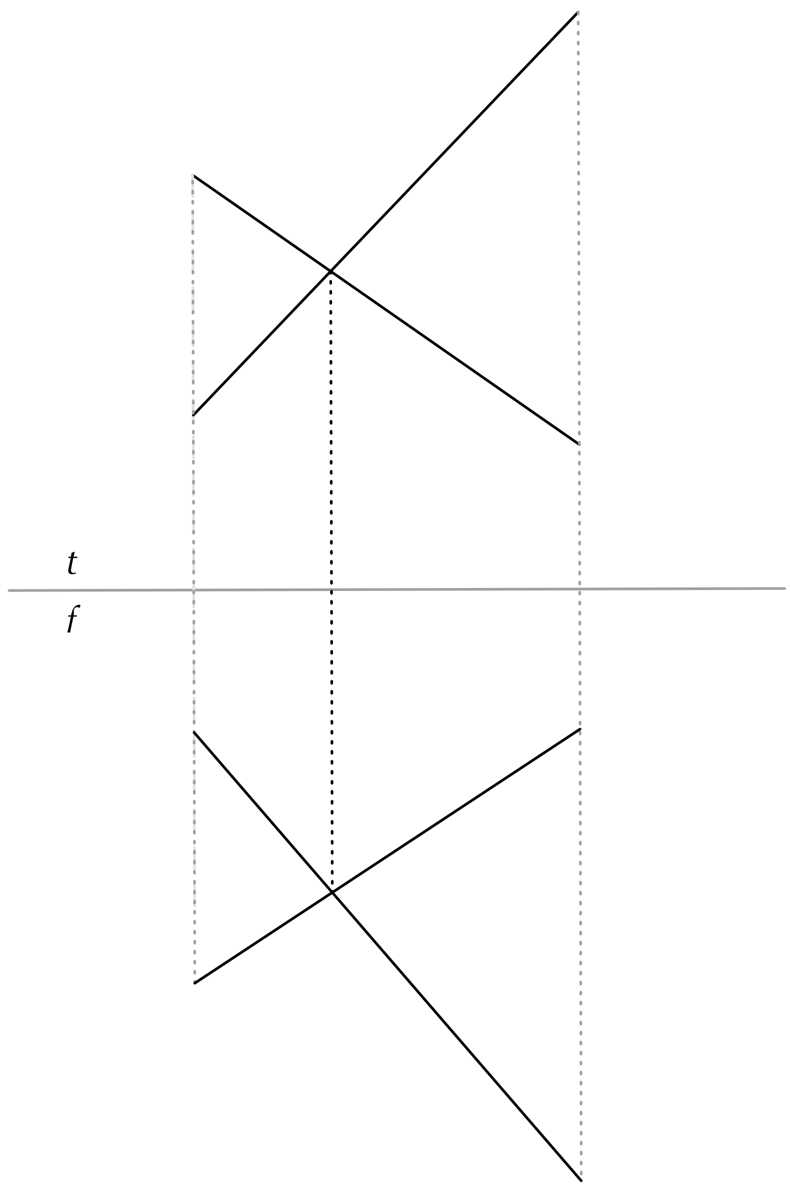

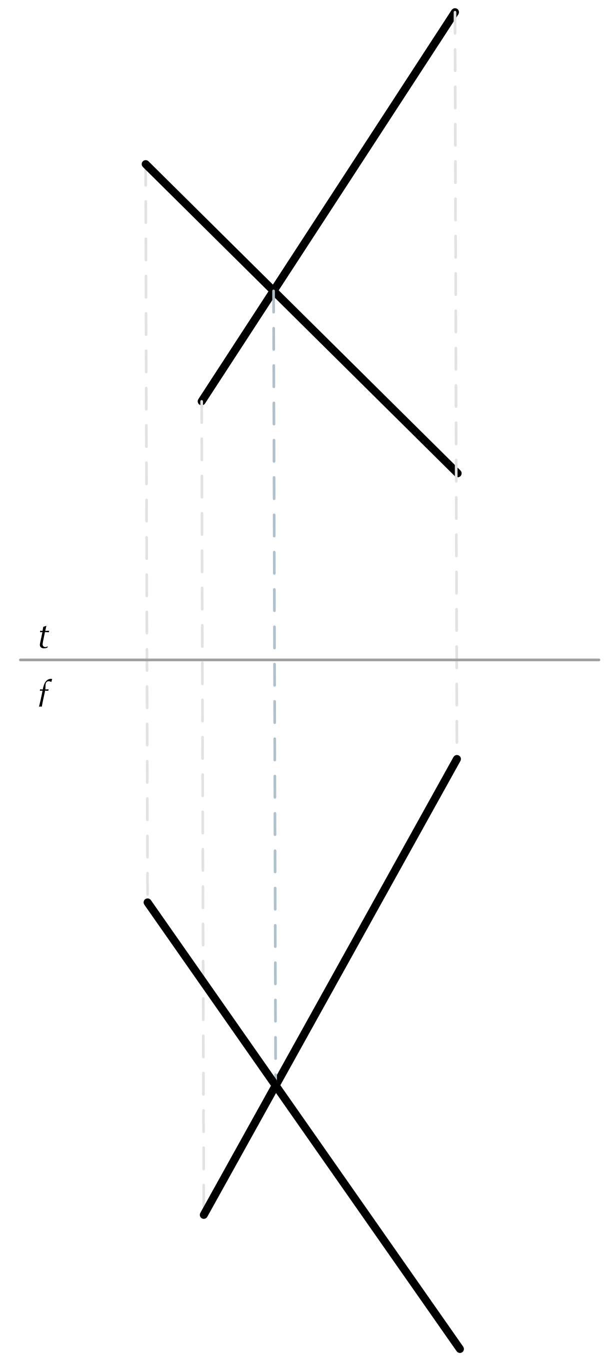

- how do we handle these cases?