## SOLID OR 3PATIAL GEOMETRY.

2. The feet of equal segments are equally distant from the foot of the normal, and conversely.

3. Of unequal segments, the longer lies further from the normal than the shorter does, and conversely.

10

P is any point, and PO is normal to the plane U, not passing through P. A, B, C are points in U.



1. PO is < PA, A being any point in U other than O. (Art. 9. Cor. 2.)  $\angle POA$  is a  $\exists$ : Proof.  $\therefore \angle PAO$  is acute, and PO < PA; (P. Art. 62.) and the normal segment PO is the shortest segment from P to the plane U.

2.  $P_{\Delta} = PB$ ; then OA = OB.

Proof. The right-angled triangles POA and POB have their hypothenuses equal, and the side PO in common. They are therefore congruent (P. Art. 65), and OA = OB.

Conversely, if OA = OB, the congruence of the same . triangles gives PA = PB.

3. PC is > PA; then OC is > OA.

For the two triangles POA, POC, being each rightangled, give

 $PC^{2} = PO^{2} + OC^{2}$ ;  $PA^2 = PO^2 + OA^2$ 

and

 $\therefore PC^2 - PA^2 = OC^2 - OA^2.$ 

 $PC > PA; \therefore OC > OA.$ 

But

And conversely, if OC > OA, then PC > PA.