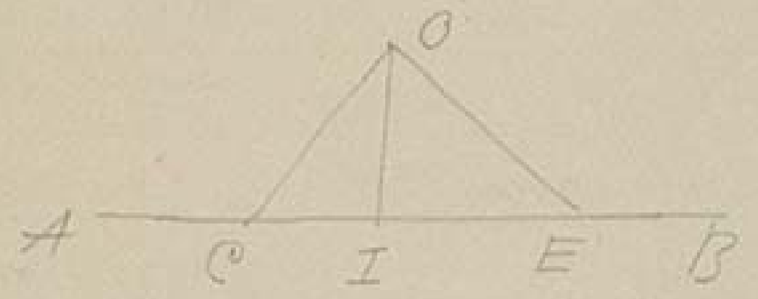
幾何学答案　Geometry　97点

Geometry. (page 1)

1°



In the triangles OIE and OIC,

$CI = IE$

OI is common

$\angle OIC = \angle OIE$, OI being perpendicular

$\therefore \triangle OIE = \triangle OIC$, hence corresponding sides OE and OC which are opposite the equal angles OIC, and OIE, must be equal to one another.

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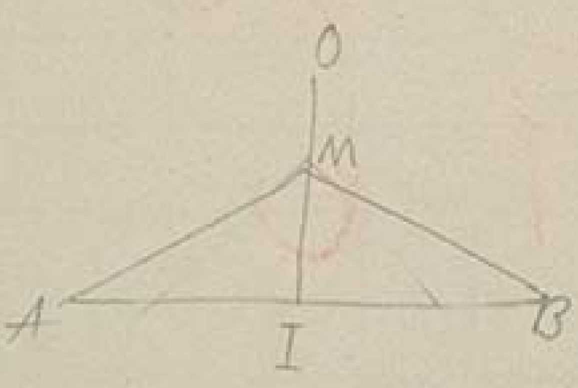
Converse proposition. If the two obliques OC and OE are equal to one another, then their departures IC and IE will be equal. <u>Prove</u>. The triangle COE is the isosceles because the sides OC and OE are equal to one another (by hypothesis) therefore if we draw perpendicular OI from the vertex O to the base CE it will bisect that base by the property of isosceles triangle, therefore IC is equal to IE; hence the proposition.

2°



Let OI be the perpendicular bisector of the straight line AB, then we are to prove OI is the locus of points in the plane equidistant from the extremities of AB.
Since in order to establish a locus two propositions are always necessary, we will first prove the direct and then the second proposition.

Direct. Every point M on the perpendicular bisector (OI) is the equidistant from the extremities A and B of the str. line AB: because in the triangles AIM and BIM,

MI is common

AI = BI (by hypothesis)

the ∠MIB = ∠MIA (OI being perpendicular bisector of AB)

∴ △MIA = △MIB, ∴ MA = MB, that is every point M on ~~..~~ OI is equidistant from A, B.

Converse. Every point M which is equidistant from A, B will be on OI: because in the triangle MAB, MA = MB, therefore MAB is the isosceles, therefore if we draw the perpendicular OI from the vertex M to the base AB it will bisect AB by the property of isosceles triangle, ∴ M must be on OI which is perpendicular bisector of AB. Thus we have proved by the two propositions (direct and its converse) that perpendicular bisector of a str. line is the locus of pts. in the plane equidistant from the extremities of that str. line.

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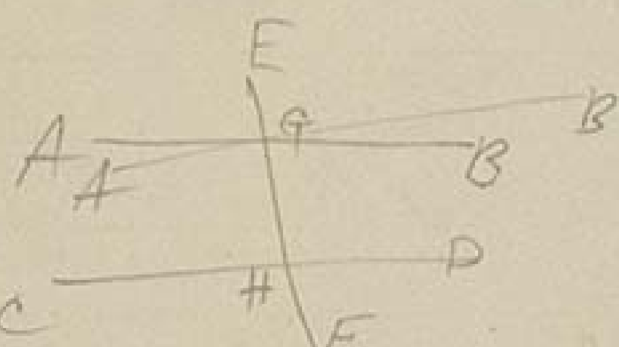
3°



If two str. lines AB, CD be cut by a secant EF and the sum of the two interior angles BGH and GHD on the same side of the secant is not equal to two rights angles, then AB and CD are not parallel

Cor. I If two str. lines AB, CD be cut by a secant EF and the sum of the two interior angles BGH and GHD on the same side of the secant EF is less than two right angles, then AB, CD will meet on that side of EF on which ∠BGH and ∠GHD are situated. Because if we draw the parallel line A'B', ∠B'GH being greater than ∠BGH, GB will fall within A'B', ∴ GB and HD will meet. (This cor. was adopted by Euclid as the axioms)

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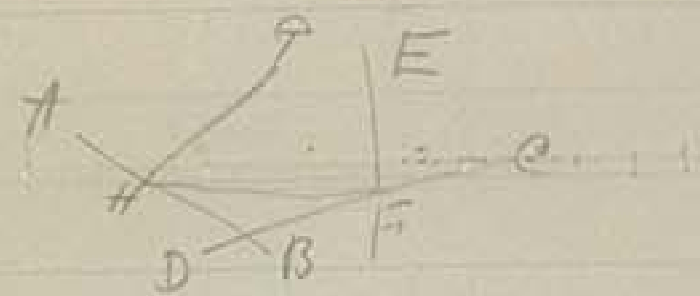
Cor. 2.

A perpendicular AB and an oblique EF drawn to a straight line CD will meet one another. because the sum of the ∠EFB and ∠ABF is less than 2 R∠s.

Cor. 3.



If two str. lines EF and GH are perpendicular respectively to AB and CD which are cut one another, then EF GH will meet one another. Because if we draw FH, it is evident the sum of ∠GHF and ∠EFH is less than two right angles.

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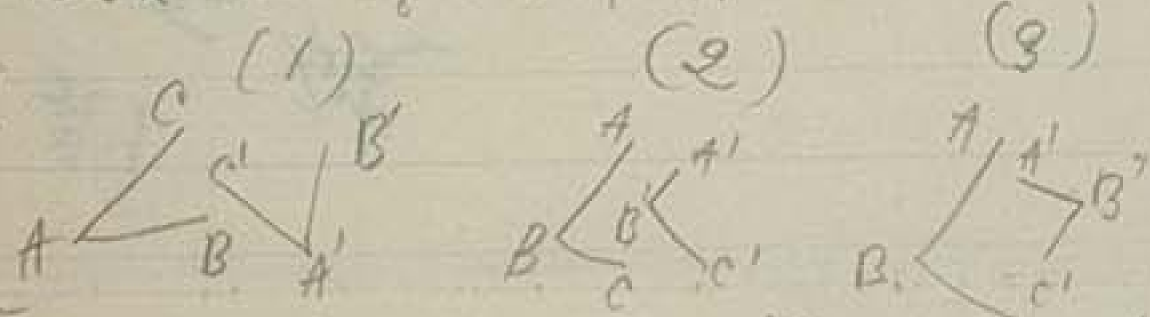
4°.



There are three cases (1) if AC and AB are respectively ⊥ to A'C' and A'B', and A'C' drawn toward AC, AB drawn toward A'B', then ∠CAB = ∠C'A'B'! Because if we turn the ∠B'A'C' ~~two~~ toward right hand around vertex A' through a right angle then ∠CAB, ∠C'A'B' have their sides parallel each to each and the parallel sides drawn in the same direction ∴ ∠CAB = ∠B'A'C'. (2) if A'B' and B'C' are respectively ⊥ to AB and BC and A'B', B'C' drawn away from AB and BC, then ∠ABC + ∠A'B'C' = 2 R∠s. Because if we turn A'B'C' toward right hand around the vertex B' through a R∠ then the two angles have their sides parallel each to each and the two parallel sides drawn in the same direction and the other in the contrary direction ∴ ∠ABC + ∠A'B'C' = 2 R∠s. (3)

In the (3) case it is just equal with second.

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