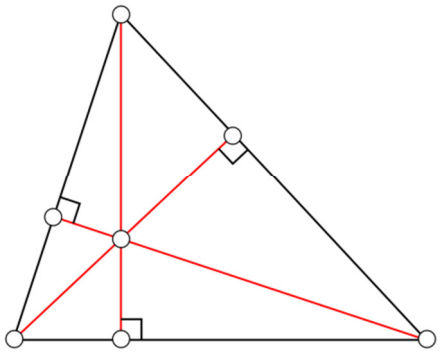
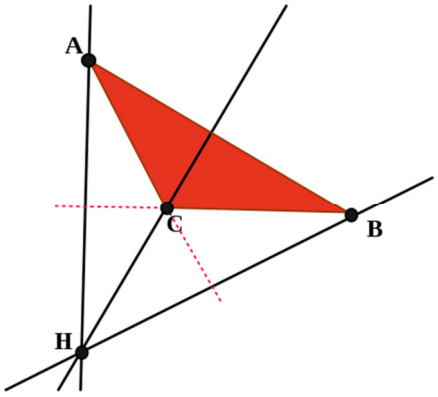
Orthocenter theorem

The three altitudes of a triangle (perpendiculars from the vertices to their opposite edges) meet at a point, which is called the ***orthocenter***.



(***Source:*** https://en.wikipedia.org/wiki/Altitude_(triangle))

There are several things about this result which show the power of deductive logic. First of all, even with fairly careful drawing it is not necessarily easy to draw this conclusion from empirical evidence. Second, even though a drawing might seem to suggest the conclusion, there are questions whether the drawing is general enough to include all possibilities. For example, suppose that one of the angles in the triangle is obtuse. Then the perpendiculars may be spread out over a wide distance and it might not be physically possible to see whether the lines actually do pass through a single point. The drawing below gives an example; in this picture the point **H** is the orthocenter.



(***Same source as before***)

For more on this and related results, see the first nine pages of the following file:

http://math.ucr.edu/~res/math133-2018/geometrynotes03b.f13.pdf