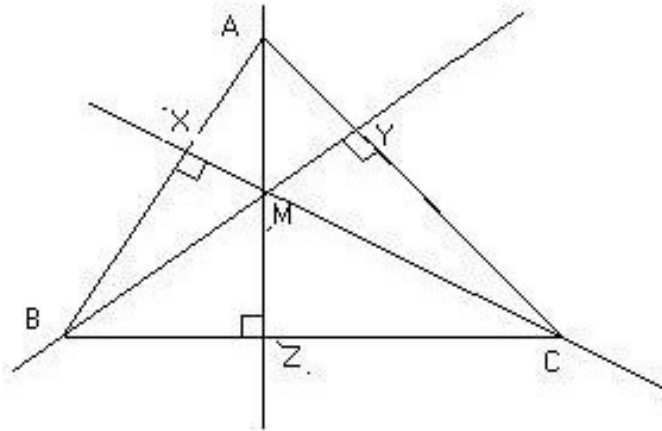


## Orthocenter

Explore Orthocenter. Use GSP for the activity.

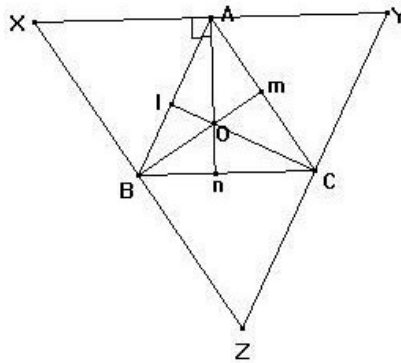
1. Create  $\triangle ABC$ .
2. Draw perpendiculars from each vertex to the opposite sides. Label these points of intersection X, Y, Z.



3. Drag the three vertices A, B, and C to different positions. What do you notice about points X, Y, and Z? (i.e. are  $\angle X$ ,  $\angle Y$ , and  $\angle Z$  anything other than right angles at any point?).
4. Is there ever a time when there is not an intersection of all three perpendicular lines? (Hint: This point of intersection of the altitudes of a triangle I called the orthocenter).



Using  $\triangle ABC$ , draw from each vertex a parallel line to the opposite side of the triangle. Label the new points of intersection  $X$ ,  $Y$ , and  $Z$  respectively to create a new triangle  $XYZ$ .



9. Construct the orthocenter of  $\triangle ABC$ . Measure segments  $XA$  and  $AY$ . What is point  $A$  with respect to  $XY$ ?

10. What role does the altitude  $AO$  play with respect to the side of  $XY$  of triangle  $\triangle XYZ$ ? (Hint: recall how  $XY$  is obtained?).

11. It follows that the orthocenter of  $\triangle ABC$  becomes what important center of  $\triangle XYZ$ ?