1. Construct the perpendicular bisector of a line segment $AB$.

2. Construct the angle bisector of an angle $C\hat{A}B$.

3. Prove that the altitudes of a triangle concur.
   (The point of concurrence is called the orthocentre.)
   \textbf{Hints.} Let the triangle be $ABC$.
   Construct $EF$ through $B$ s.t. $EF\parallel AC$, $DE$ through $C$ s.t. $EF\parallel AB$, $DF$ through $A$ s.t. $EF\parallel BC$.
   Show altitudes of $\triangle ABC$ are $\perp$ bisectors of sides of $\triangle DEF$.

4. Prove that the medians of a triangle concur.
   (The point of concurrence is called the centroid.)
   Also show that the medians trisect each other, i.e. cut each other in the ration 2 : 1.
   \textbf{Hints.} Let the triangle be $ABC$.
   Construct medians $AE$, $BD$ and call their point of intersection $O$.
   Construct midpoints $R$, $S$ of $OA$ and $OB$, respectively.
   Show $RSED$ is a parallelogram.
   Construct median $CF$. Let intersection of $AE$ and $CF$ be $O'$.
   Show $O = O'$.

5. Draw triangle $ABC$. Let the sides opposite angles $\angle A, \angle B, \angle C$ be $a, b, c$, respectively.
   
   (i) Show $a = b \cos C + c \cos B$.
   \textbf{Hint.} Drop a perpendicular from $A$ to $BC$.
   
   (ii) Deduce $\sin(B + C) = \sin B \cos C + \sin C \cos B$.

6. Prove that in any triangle $ABC$, with sides $a, b, c$ as described in the previous question:
   $$a(\sin B - \sin C) + b(\sin C - \sin A) + c(\sin A - \sin B) = 0.$$ 
   \textbf{Hint.} Substitute $\sin A = a/(2R)$, etc. in the LHS and simplify.

7. Prove area of triangle $ABC$, is given by $abc/(4R)$, where $a, b, c$ are as described previously and $R$ is the circumradius.
   \textbf{Hint.} Use the sine area formula for a triangle and use the Sine Rule.