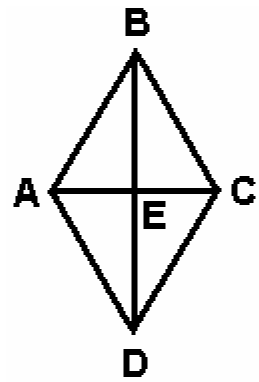
FIGURES FOR SOLUTIONS TO SELECTED EXERCISES

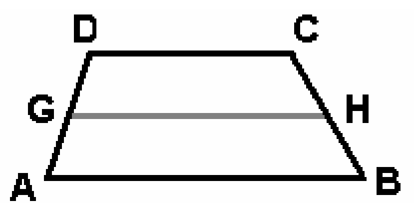
III.3 : Convex polygons

III.3.1.

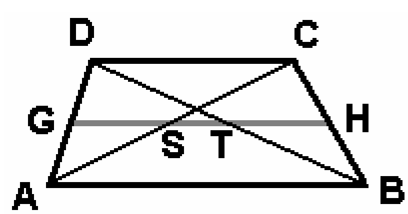


The points **A, B, C, D** form the vertices of a parallelogram**,** and the objective is to show that this parallelogram is a rhombus (all sides have equal length) if and only if **AC** is perpendicular to **BD.**

III.3.7.

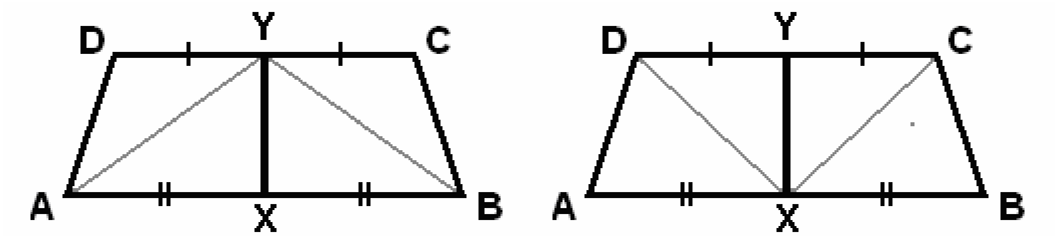


The points **A, B, C, D** form the vertices of a trapezoid with **AB** || **CD,** and the midpoints of **[AD]** and **[BC]** are **G** and **H** respectively**.** In the first part of this exercise**,** the objective is to show that **GH** is parallel to **AB** and **CD** and to find its length in terms of the lengths of **[AB]** and **[CD].**



In the final part of the exercise the objective is to show that the midpoints **S** and **T** of the diagonals **[AC]** and **[BD]** both lie on the line **GH.**

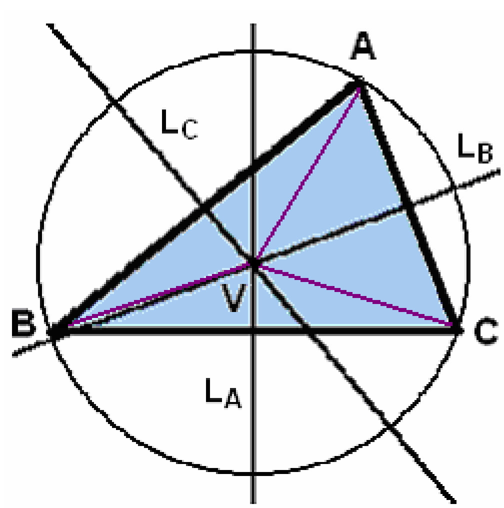
III.3.10.



We are assuming that the points **A, B, C, D** form the vertices of an ***isosceles*** trapezoid with **AB || CD,** and the points **X** and **Y** are the midpoints of **[AB]** and **[CD]** respectively**.** The idea is to use the basic properties of an isosceles triangle (various parts have equal measurements) to show that △**ADY** ≅ △**BCY** and △**XAD** ≅ △**XBC,** so that **Y** will be equidistant from **A** and **B,** and **X** will be equidistant from **C** and **D.**

III.4 : Concurrence theorems

III.4.2.



Given that the circumcenter **V** of △**ABC** lies in the interior of that triangle**,** the goal is to prove that all three vertex angles are acute**.** By the Addition Postulate for angle measurement**,** at each vertex **D** the measure of the vertex angle at **D** can be written as a sum of the measurements of two other angles in the drawing**;** note that the angle sum for each triangle in the drawing is equal to **180** degrees**.**