

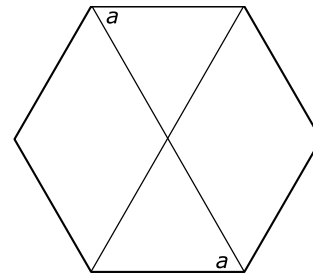
**MATH 5: HOMEWORK 22**  
**GEOMETRY 2.**

1. Let  $CD$  be a continuation of side  $AC$  in a triangle  $\triangle ABC$ . Show that then  $\angle BCD = \angle A + \angle B$  (such an angle is sometimes called an *exterior angle* of the triangle. [Hint: sum of the angles in a triangle is equal to  $180^\circ$ .])

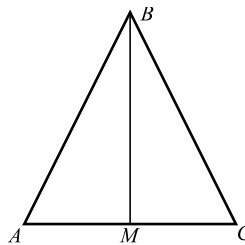
2. An  $n$ -gon is called *regular* if all sides are equal and all angles are also equal.

- (a) How large is each angle in a regular hexagon (6-gon)?  
(b) Show that in a regular hexagon, opposite sides are parallel. (This is the reason why this shape is used for nuts and bolts).

[Hint: show that each of the angles labeled by letter  $a$  in the figure is equal to  $60^\circ$ , and then use theorem about alternate interior angles.]



3. Let  $ABC$  be a triangle in which two sides are equal:  $AB = BC$  (such a triangle is called *isosceles*). Let  $M$  be the midpoint of the side  $AC$ , i.e.  $AM = MC$ .
- Show that triangles  $\triangle ABM$  and  $\triangle CBM$  are congruent.
  - Show that angles  $\angle A$  and  $\angle C$  are equal
  - Show that  $\angle AMB = 90^\circ$  (hint:  $\angle AMB = \angle CMB$ ).



4. Let  $ABCD$  be a quadrilateral such that  $AB = BC = CD = AD$  (such a quadrilateral is called *rhombus*). Let  $M$  be the intersection point of  $AC$  and  $BD$ .
- Show that  $\triangle ABC \cong \triangle ADC$
  - Show that  $\triangle AMB \cong \triangle AMD$
  - Show that the diagonals are perpendicular and that the point  $M$  is the midpoint of each of the diagonals.

[Hint: after doing each part, mark on the figure all the information you have found — which angles are equal, which line segments are equal, etc: you may need this information for the following parts.]

