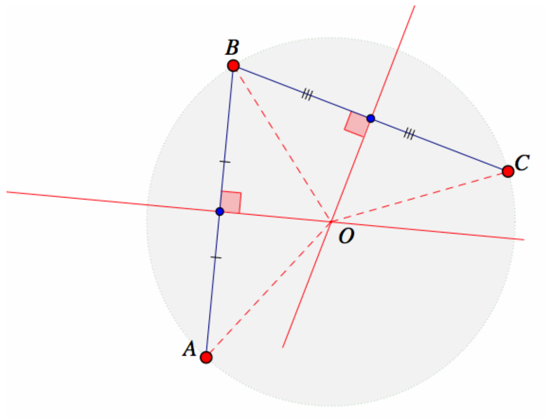
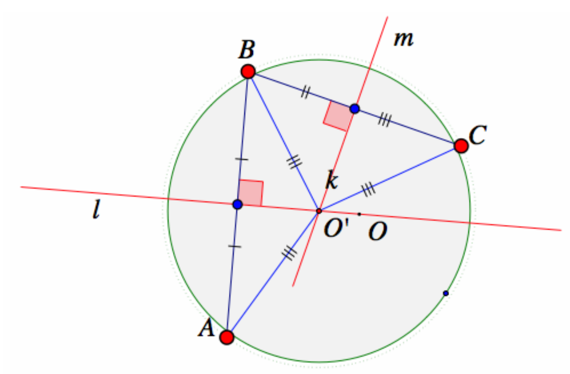
MTH 343 Workbook 2

Theorem:
A circle is uniquely **determined** by 3 non-collinear points.



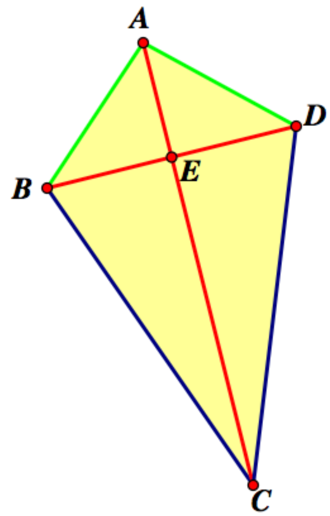
Theorem:
A circle is **uniquely** determined by 3 non-collinear points.



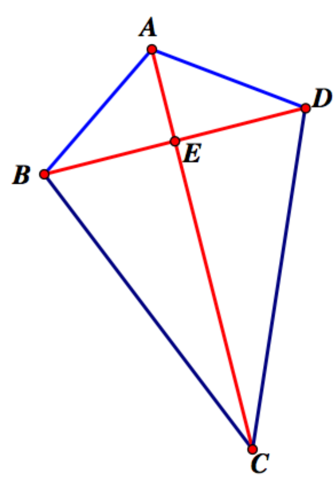
Proof :

Let O' be equidistant from A, B and C. We now wish to show that O' = O. Since l cannot be parallel to m, they must intersect at some point O. But O' must also be on l and m.
$\therefore O' = O$

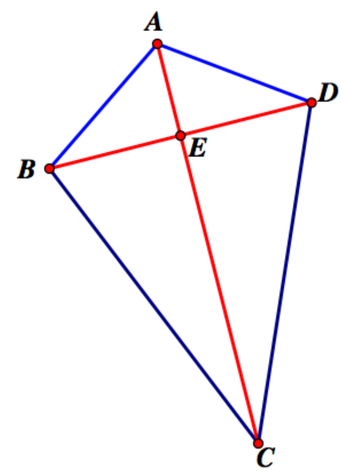
Theorem:
The two diagonals of any kite are perpendicular.



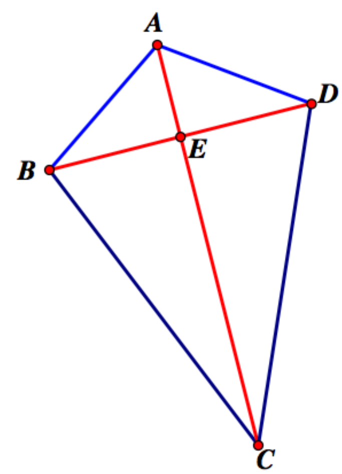
Theorem:
The area of any kite can be calculated by one half the product of the diagonals .



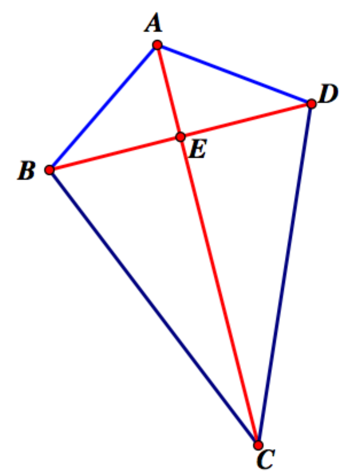
Theorem:
One diagonal divides a (convex) kite into two isosceles triangles, the other (the axis of symmetry) divides the kite into two congruent triangles.



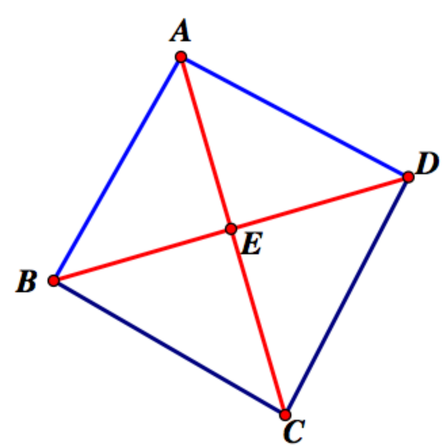
Theorem:
The two interior angles at opposite vertices of a kite are congruent.



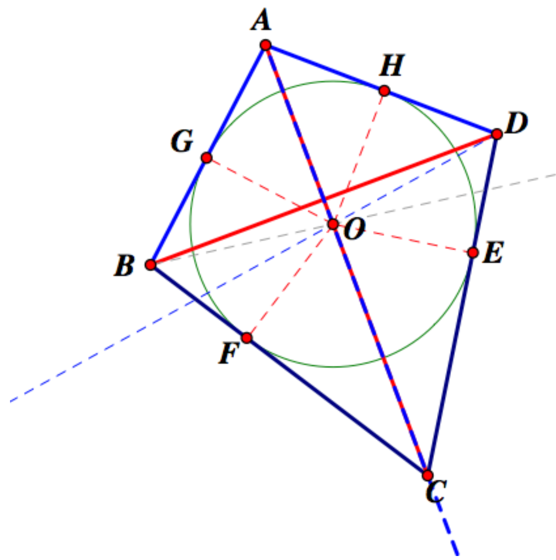
Theorem:
One diagonal of a kite is the perpendicular bisector of the other.



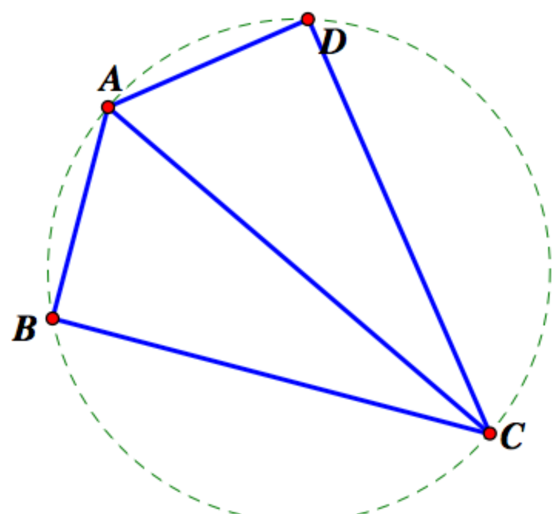
Theorem:
If a kite is equiangular, then it is a square.



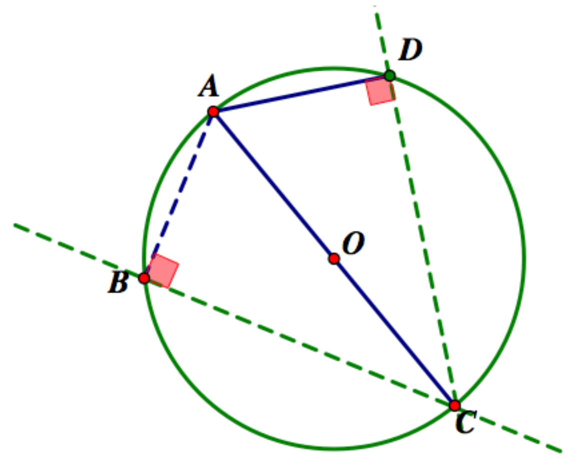
Theorem:
Every convex kite has an inscribed circle.



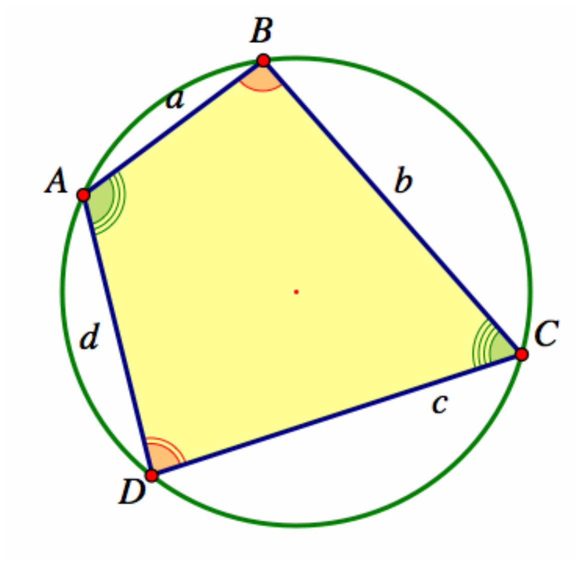
Theorem:
If a kite can be inscribed in a circle then the equal angles are right angles..



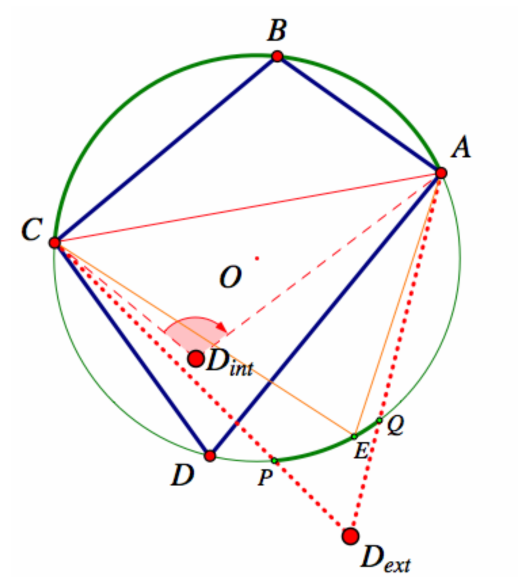
Theorem:
If the equal angles of a kite are right angles, then the a kite can be inscribed in a circle.



Theorem:
In any cyclic quadrilateral , opposite angles are supplementary.

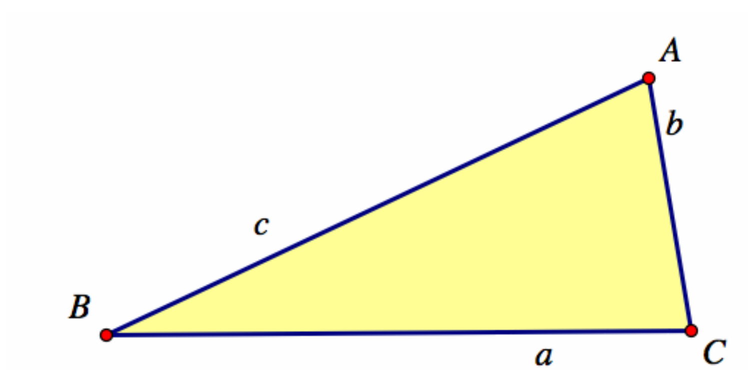


Theorem:
If the opposite angles in a quadrilateral are supplementary, then the quadrilateral is cyclic.



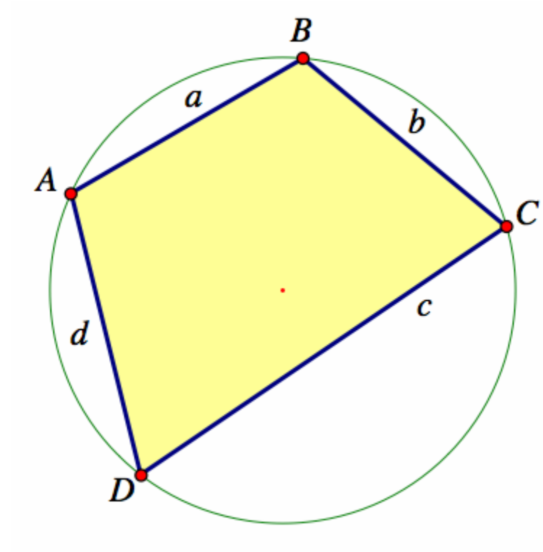
Theorem: (**Heron**) :
In any triangle,

$$\text{Area}(\triangle ABC) = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{1}{2}(a+b+c).$$



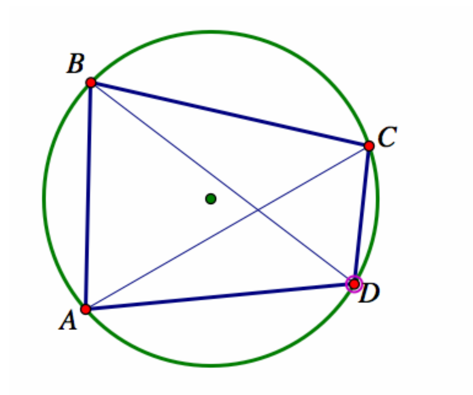
Theorem (Brahamagupta):
If the opposite angles in a quadrilateral are supplementary, then the quadrilateral is cyclic.

$$\text{Area}(ABCD) = \sqrt{(s-a)(s-b)(s-c)(s-d)} \text{ where } s = \frac{1}{2}(a+b+c+d).$$



Theorem (Ptolemy):
In any cyclic quadrilateral, the product of the diagonals is equal to the sum of the products of the opposite sides.

$$\overline{BD} \cdot \overline{AC} \cong (\overline{AB} \cdot \overline{CD}) + (\overline{BC} \cdot \overline{DA})$$



Theorem (Ptolemy Converse):

If the product of the diagonals of a quadrilateral is equal to the sum of the products of the opposite sides $\overrightarrow{BD} \cdot \overrightarrow{AC} \cong \overrightarrow{AB} \cdot \overrightarrow{CD} + \overrightarrow{BC} \cdot \overrightarrow{DA}$, then the quadrilateral is cyclic