Theorem 47: The interior angles of a triangle add up to 180º.

Definition: A **quadrilateral** is a set of 4 vertices (A, B, C, D), and 4 segments, called **sides**, that connect the vertices in a circular order (AB, BC, CD and DA) such that no three vertices are collinear and no two segments intersect at a point other than an endpoint. Two vertices that are not connected by a side are called **opposite** vertices, and two vertices that are connected by a side are called **adjacent** vertices. Two sides that share a vertex are **adjacent**, and two sides that do not share a vertex are **opposite**. Segments that join opposite vertices are **diagonals** of the quadrilateral.

Definition: A **parallelogram** is a quadrilateral with two pairs of parallel (opposite) sides.
Definition: A **rhombus** is a quadrilateral with 4 congruent sides.
Definition: A **rectangle** is a quadrilateral with 4 right angles
Definition: A **kite** is a quadrilateral with 2 (disjoint) congruent adjacent sides.

Conjectures about quadrilaterals:
Q1. The angles in a quadrilateral add up to 360° *Proved*

Conjectures about parallelograms:

P1. The diagonals of a parallelogram bisect each other
P2. The opposite angles of a parallelogram are congruent *Proved using P4 *will be reordered**
P3. The opposite sides of a parallelogram are congruent.
P4. The adjacent angles of a parallelogram are supplementary *Proved*
P5. If the opposite sides of a quadrilateral are congruent, then it is a parallelogram.
~~P6. If all pairs of adjacent angles in a quadrilateral are supplementary, then it is a parallelogram.~~*True but replaced by new P7*
P7. If ~~two pairs of adjacent angles~~ *opposite angles in a quadrilateral are supplementary to the same adjacent angle*, then it is a parallelogram. *Proved with change in wording.*
P8. If at least one pair of adjacent angles in a quadrilateral are supplementary, then it is a parallelogram.
P9. If the opposite sides of a quadrilateral are congruent, then it is a parallelogram.
P10. If a quadrilateral has both pairs of opposite angles congruent, then it is a parallelogram.
P11. If a quadrilateral has at least one pair of opposite angles congruent, then it is a parallelogram.
P12. If a quadrilateral has diagonals that bisect each other, then it is a parallelogram.

Conjectures about Rhombi:

Rh1. The opposite sides of a rhombus are parallel.
Rh2. The diagonals of a rhombus bisect each other.
Rh3. The diagonals of a rhombus are perpendicular
Rh4. Each diagonal of a rhombus splits it into two isosceles triangles
Rh5. A rhombus has (at least one) pair of congruent angles
Rh6. The adjacent angles in a rhombus are supplementary.
Rh7 The opposite angle in a rhombus are congruent.

Rh8. If the opposite sides of a quadrilateral are parallel, and its diagonals are perpendicular, then it is a rhombus.
~~Rh9. If the opposite sides of a quadrilateral are congruent, then it is a rhombus.~~ *Incorrect as written*
~~Rh10. If the opposite angles of a quadrilateral are congruent, then it is a rhombus.~~ *Incorrect as written*
~~Rh11. If the diagonals of a quadrilateral bisect each other, then it is a rhombus.~~ *Incorrect as written*
~~Rh12. If all pairs of adjacent angles are supplementary, then it is a rhombus.~~ *Incorrect as written*
Rh13. If the diagonals of a quadrilateral bisect each other and are perpendicular, then it is a rhombus. *Proved*
Rh14. If the diagonals of a quadrilateral split it into 4 congruent triangles, then it is a rhombus.
Rh15. Every rhombus is a kite.

Conjectures about Rectangles:

Rc1. The diagonals in a rectangle are the same length, and they bisect each other.
Rc2. Every rectangle is a parallelogram.
Rc3. The opposite sides of a rectangle are congruent.
Rc4. If a quadrilateral has a pair of opposite supplementary angles then it is a rectangle.
Rc5. If a quadrilateral has congruent bisecting diagonals, then it is a rectangle.
Rc6. If the opposite sides of a quadrilateral are congruent, then it is a rectangle.
Rc7. If every pair of adjacent sides of a quadrilateral are perpendicular, then it is a rectangle.
Rc8. If at least one pair of adjacent sides of a quadrilateral are perpendicular, then it is a rectangle.
Rc9 (Euclid). Given a quadrilateral with one side called a base, and the sides adjacent to the base are called the legs, if the legs congruent to each other, and are perpendicular to the base, then it is a rectangle.

Conjectures about Kites:

K1. One pair of opposite angles in a kite are congruent.
K2. The sum of the lengths of the two shorter sides is shorter than the sum of the two longer lengths of a kite.
K3. A diagonal of a kite divides it into two isosceles congruent triangles
~~K4. The two diagonals of a kite divide it into 4 right triangles~~. *Incorrect as written*
~~K5. The diagonals of a kite bisect each other at a right angle.~~ *Incorrect as written*
~~K6. A diagonal of a kite divides it into two isosceles triangles.~~ *Incorrect as written*
~~K7. A diagonal of the kite bisects the angle between two non-congruent sides.~~ *Incorrect as written*
~~K8. The diagonals of a kite interseet~~ *Incorrect as written*
K9. The angles at the vertices of the non-adjacent sides are congruent.
K10. The angle at the vertex of the shorter pair of congruent sides is larger than the angle at the vertex of the longer pair of congruent sides.
K11. If the diagonals of a quadrilateral bisect each other and are perpendicular, then it is a kite.

K12. If a quadrilateral has perpendicular diagonals, and one diagonal bisects the other, then it's a kite.
K13. If a quadrilateral has exactly one pair of opposite congruent angles, then it is a kite.