Definitions

straight angle: An angle measuring 180°. It forms a straight line.

vertical angles: When two lines intersect, the angles opposite each other.

angle of rotation: an amount of rotation about a fixed point. One full rotation is 360°. Angles surrounding a point sum to 360° because they constitute one full rotation.

angle formed by two rays with common endpoint P: the smallest amount of counterclockwise rotation about P needed to rotate one of the rays to the position of the other ray.

triangle: A closed shape in a plane consisting of three line segments.

congruent angles: two angles that have the same measure

line segment: the part of a line lying between two points on a line.

ray: the part of a line lying on one side of a point on the line.

right angle: equal to 90°
acute angle: less than 90°
obtuse angle: greater than 90°
*complementary angles—add to 90°
*supplementary angles—add to 180°

Perpendicular: two lines that meet to form right angles
Parallel: two lines in a plane that never meet
*congruent segments—have the same length
*midpoint—the point on a line segment that divides it into two congruent segments
*segment bisector—a point or line that divides a segment into two congruent segments
*angle bisector—a ray that divides an angle in half, i.e. into two congruent angles
right triangle

scalene triangle: has no equal sides
equilateral triangle: has three equal sides
isosceles triangle: has at least two equal sides
Quadrilateral: a closed shape in a plane consisting of four line segments
Polygon: a closed shape in a plane consisting of a finite number of line segments
      vertex: corner point where two sides meet
      interior angle: angle at a vertex, inside the polygon
      exterior angle: angle at a vertex formed by extending one side and measuring to the adjacent side.
square: quadrilateral with four equal sides and four right angles

rectangle: quadrilateral with four right angles
rhombus: quadrilateral with four equal sides
parallelogram: quadrilateral with both pairs of opposite sides parallel
trapezoid: quadrilateral with at least one pair of opposite sides parallel
*kite—a quadrilateral with two non-overlapping pairs of congruent adjacent sides (ex)
Diagonal: line segment connecting two non-adjacent vertices (corners) of a polygon
*opposite angles (in a quadrilateral)—angles that do not share a side
*consecutive angles (in a polygon)—angles that share a side
Circle: the collection of all the points in a plane that are a certain fixed distance (the "radius") away from a certain fixed point (the "center") in the plane.

Axioms Summary

These first assumptions will be helpful when we want to add or extend a line in a diagram.

1. Two points determine a line (i.e., you can only draw one line through two points).
2. A line can be extended indefinitely.
3. Given the line l and a point P not on l, there is exactly one line through P parallel to l.
4. In a plane, exactly one perpendicular can be drawn from a point to a line.
5. In a plane, exactly one perpendicular line can be drawn to a point on a line.
6. An angle has exactly one bisector.
7. A segment has exactly one midpoint.

These additional assumptions will help us complete proofs:

8. All right angles are congruent.

9. "Substitution" or "Transitive Property": Things which are equal to the same thing are also equal to each other.

10. Algebra: We can use the rules of algebra to solve equations (e.g. we can subtract the same amount from both sides of an equation).

12. "Reflexive Property": A segment is congruent to itself; an angle is congruent to itself.

13. Lines are parallel if and only if corresponding angles are congruent (parallel postulate)

14. Lines are parallel if and only if alternate interior (or exterior) angles are congruent.

15. Lines are parallel if and only if same-side interior (or exterior) angles add to 180° (i.e., "are supplementary").

(up to date) Theorems List (we will add to this list!)

1. Vertical angles (opposite angles) are congruent.

2. The sum of the interior angles in an n-gon is 180(n – 2).

3. The sum of the exterior angles of a convex polygon is 360°

4. If two triangles share AAS, SSS, SAS, or ASA congruence then they are congruent.

5. (Base Angles Theorem) Base angles of a triangle/trapezoid are equal if and only if it is isosceles.

6. Given a quadrilateral, it is a parallelogram if and only if opposite sides are congruent.

7. Given a quadrilateral, it is a parallelogram if and only if opposite angles are congruent.

8. Given a quadrilateral, it is a parallelogram if and only if diagonals bisect each other.

9. Given a parallelogram, it is a rectangle if and only if diagonals are congruent.

10. Given a parallelogram, it is a rhombus if and only if the diagonals are perpendicular bisectors.

11. Rectangles and Rhombi are parallelograms.

12. A kite is a trapezoid if and only if it is a rhombus.

13. (Pythagorean Theorem) A right triangle with legs of length a, b satisfies $a^2+b^2=c^2$ where c is the length of the hypotenuse.