# Chapter 3: Angle Pairs and Perpendicular Lines

### Definitions of Supplementary and Complementary Angles

* Two angles are *supplementary* if the sum of their measures is 180. .
* Two angles are *complementary* if the sum of their measures is 90. .

### Definition of Adjacent Angle Pairs

Two angles are an *adjacent pair* if they:

* Have the same vertex.
* Share a common side.
* Have no interior points in common.

Theorem 3.1

* If the exterior sides of a pair of adjacent angles form a straight line, then the angles are supplementary.

### Definition of Vertical Angles

Vertical angles are pairs of non-adjacent (opposite) angles formed by two intersecting lines.

Theorem 3.2

If two angles are complementary (or supplementary) to the same angle or to congruent angles, then they are *congruent*.

Theorem 3.3

Vertical angles are congruent.

Theorem 3.4

All right angles are congruent.

Theorem 3.5

If two angles are congruent and supplementary, then each is a right angle.

### Definition of Perpendicular Lines

*Perpendicular lines* are lines that intersect to form right angles. If a line is perpendicular to a segment and intersects the segment at its midpoint, then the line is called the *perpendicular bisector* of the segment.

Theorem 3.6

If the exterior sides of a pair of adjacent angles are perpendicular, then the angles are complementary.

Theorem 3.7

Perpendicular lines intersect to form four right angles.

Theorem 3.8

Through a given point on a line, there exists exactly one perpendicular to the given line.

Postulate 3.1

Through a given point not on a line, there exists one perpendicular to the given line.

**Definitions of Distance**

* The *distance between two points* is the length of the segment joining the points.
* The *distance between a line and a point not on the line* is the length of the perpendicular segment drawn from the point to a line.

### Perpendicular Bisector

A *perpendicular bisector* of a segment is a line, ray or segment that is perpendicular to the given segment at its midpoint. Each point on the perpendicular bisector is equidistant from the endpoints of the segment.

Theorem 3.9

If two lines intersect to form congruent adjacent angles, then the lines are perpendicular.