

Chapter 7

Locus and Concurrence

7.1 Locus of Points

DEFINITIONS

43. A **locus** is the set of all point and only those points that satisfy a given condition (or set of conditions).
44. A **circle** is the locus of points in a plane that are a fixed distance from a given point.

THEOREMS, COROLLARIES AND LEMMAS

- 7.1.1 The locus of points in a plane and equidistant from the sides of an angle is the angle bisector.
- 7.1.2 The locus of points in a plane that are equidistant from the endpoints of a line segment is the perpendicular bisector of that line segment.

7.2 Concurrence of Lines

DEFINITIONS

45. A number of lines are **concurrent** if they have exactly one point in common.

THEOREMS, COROLLARIES AND LEMMAS

7.2.1 The three angle bisectors of the angles of a triangle are concurrent. This point is called the **incenter**.

7.2.2 The three perpendicular bisectors of the sides of a triangle are concurrent. This point is called the **circumcenter**.

7.2.3 The three altitudes of a triangle are concurrent. This point is called the **orthocenter**.

7.2.4 The three medians of a triangle are concurrent at a point that is $\frac{2}{3}$ the distance from any vertex to the midpoint of the opposite side. This point is called the **centroid**.

THEOREMS, COROLLARIES AND LEMMAS

7.3.1 A circle can be circumscribed about (or inscribed in) any regular polygon.

7.3.2 The measure of the central angle of a regular polygon of n sides is given by $c = \frac{360^\circ}{n}$.

7.3.3 Any radius of a regular polygon bisects the angle at the vertex to which it is drawn.

7.3.4 Any apothem of a regular polygon bisects the side of the polygon to which it is drawn.