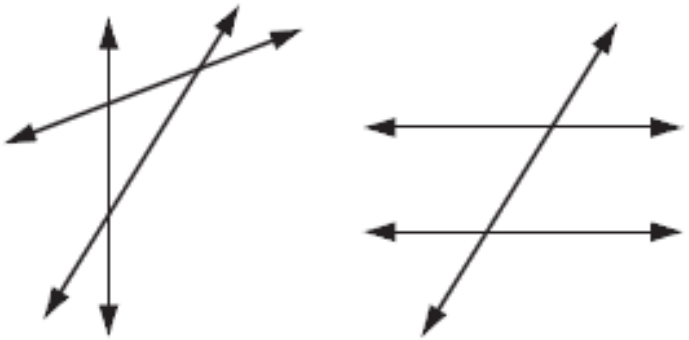
3.7 & 3.8 Constructing Points of Concurrency and Centroid

Objectives:

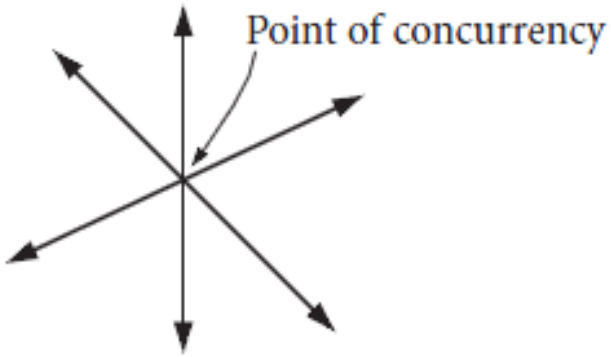
- **I CAN discover points of concurrency of the angle bisectors, perpendicular bisectors, and altitudes of a triangle.**
- **I CAN explore the relationships between points of concurrency and inscribed and circumscribed circles.**
- **I CAN discover the concurrence of the medians of a triangle (the centroid) and its applications.**
- **I CAN explore length relationships among the segments into which the centroid divides each median.**

Points of Concurrency

- What does Concurrent mean?



Not concurrent



Concurrent

Points of Concurrency

Point of concurrency: The place where three or more lines meet.

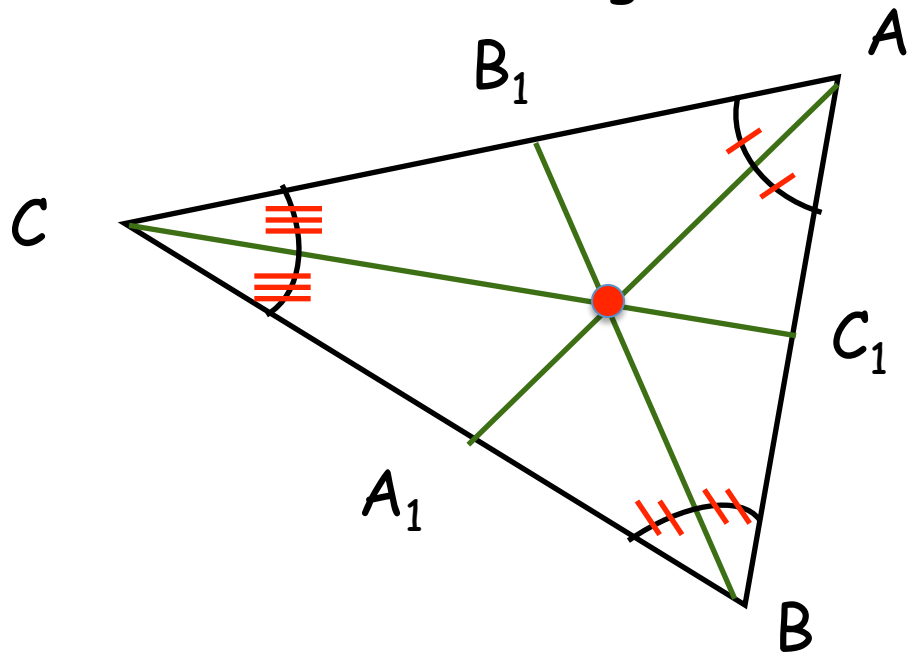
Make a checklist:

- ☐ Incenter (angle bisectors)
- ☐ Circumcenter (perpendicular bisectors)
- ☐ Orthocenter (altitudes)
- ☐ Centroid (medians)

Points of Concurrency

☑ Incenter (angle bisectors)

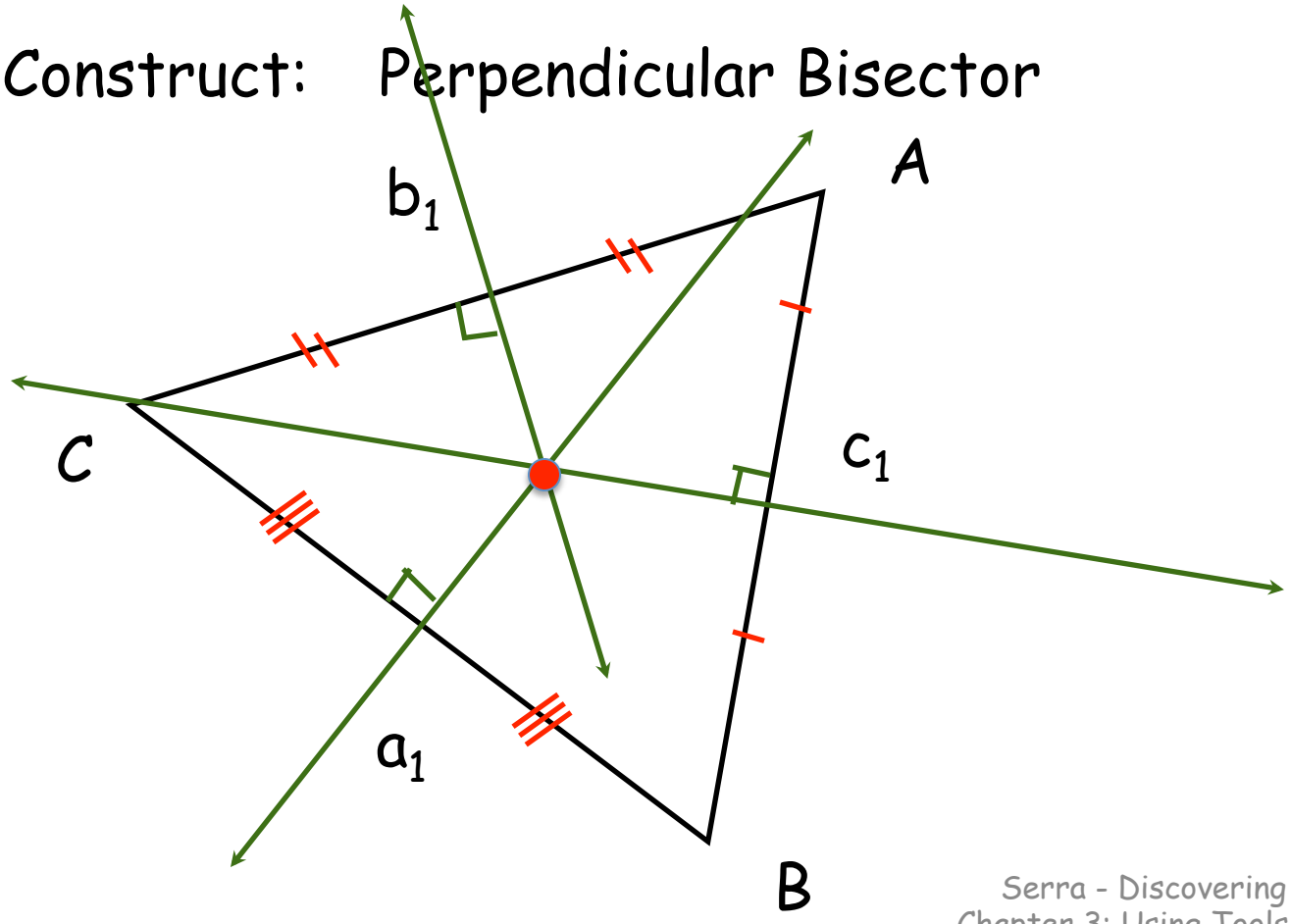
Construct: Angle Bisector



Points of Concurrency

☑ Circumcenter (perpendicular bisectors)

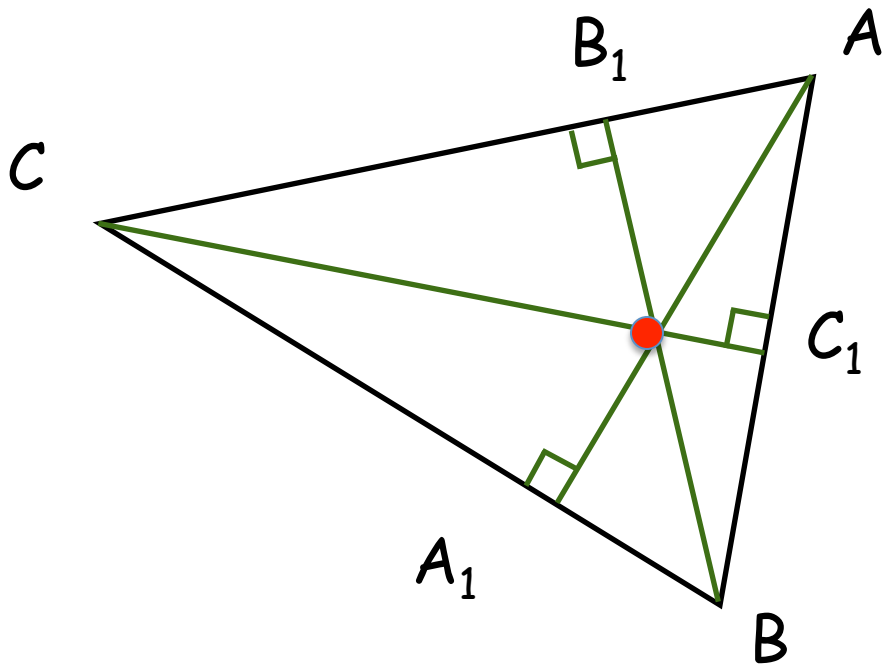
Construct: Perpendicular Bisector



Points of Concurrency

☑ Orthocenter (altitudes)

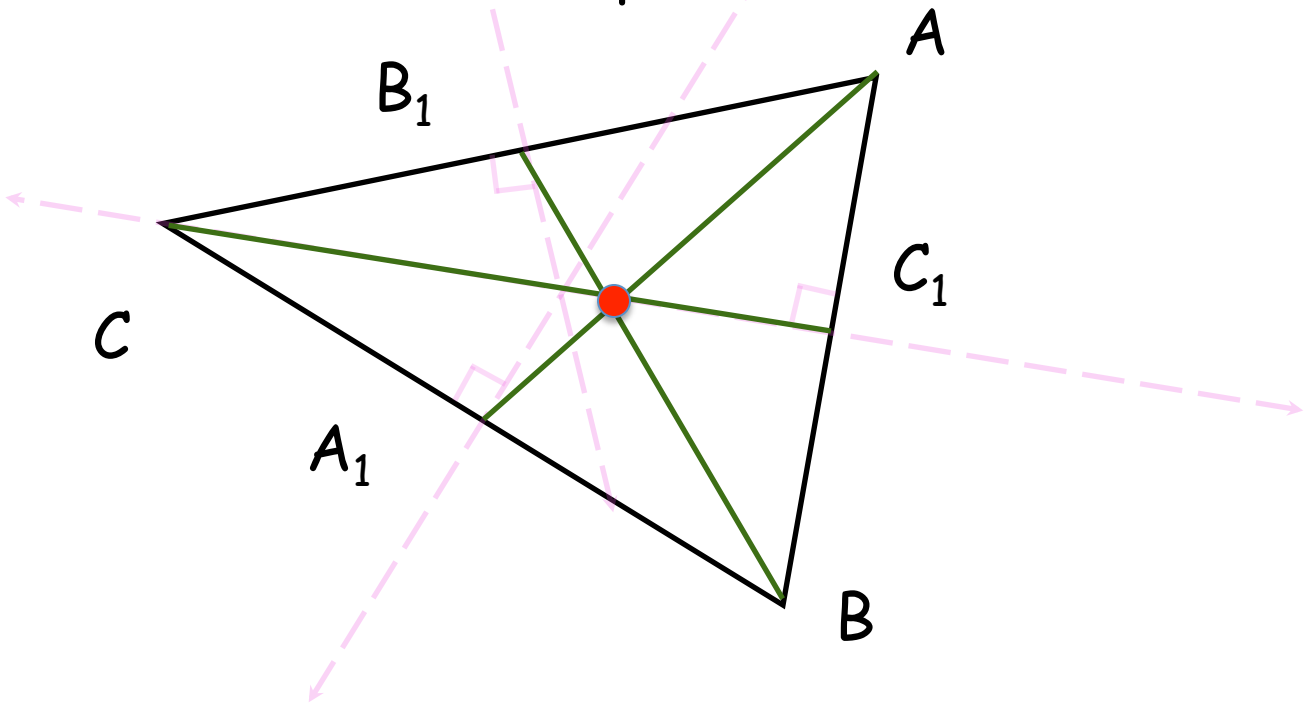
Construct: Drop a perpendicular.



Points of Concurrency

☑ Centroid (median)

Construct: Perpendicular Bisectors



Conjectures

Angle Bisector Concurrency Conjecture

The three angle bisectors of a triangle meet at a point (are concurrent).

Perpendicular Bisector Concurrency Conjecture

The three perpendicular bisectors of a triangle are concurrent.

Altitude Concurrency Conjecture

The three altitudes (or lines containing the altitudes) of a triangle are concurrent.

More Conjectures

Circumcenter Conjecture

The circumcenter of a triangle is equidistant from the vertices.

Incenter Conjecture

The incenter of a triangle is equidistant from the sides.

Median Concurrency Conjecture

The three medians of a triangle are concurrent.

Two More Conjectures

Centroid Conjecture

The centroid of a triangle divides each median into two parts so that the distance from the centroid to the vertex is _twice_ the distance from the centroid to the midpoint of the opposite side.

Center of Gravity Conjecture

The _centroid_ of a triangle is the center of gravity of the triangular region.

Construction 17-20: Lines in a Triangle

Type	Intersection of:	Special Characteristics
Con 8: Incenter	Angle Bisectors	Same distance from sides. Center of the circle inscribed in the triangle.
Con 9: Circumcenter	Perpendicular Bisectors (Sides)	Same distance from vertices. Center of the circle circumscribed about the triangle.
Con 10: Orthocenter	Altitudes (heights)	
Con 11: Centroid	Medians	2/3 distance from vertex to midpoint of opposite side.

Vocabulary

E Concurrent

D Point of Concurrency

A Incenter

C Circumcenter

B Orthocenter

A) The point of concurrency for the three angle bisectors is the incenter.

B) The point of concurrency for the three altitudes.

C) The point of concurrency for the perpendicular bisector.

D) The point of intersection

E) Three or more line have a point in common.

Vocabulary

___C___ Circumscribed

___A___ Inscribed

___D___ Centroid

___B___ Center of Gravity

A) To draw (one figure) within another figure so that every vertex of the enclosed figure touches the outer figure.

B) The balancing point for a polygon.

C) To enclose a polygon within a configuration of lines, curves, or surfaces so that every vertex of the enclosed object is lying on the enclosing configuration.

D) The point of concurrency of the three medians.

Project

Choose the project that you will do with your partner.

The projects will be presented on: