1.5 Division of Segments and Angles

Lesson Objectives: *After studying this section, you will be able to:*

- *Identify midpoints and bisectors of segments*
- *Identify trisection points and trisectors of segments*
- *Identify angle bisectors*
- *Identify angle trisectors*

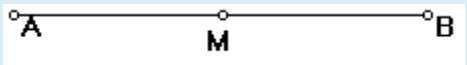
Definition:

A point (or segment, ray, or line) that divides a segment into two congruent segments BISECTS the segment. The bisection point is called the MIDPOINT of the segment.

NOTE: *Only SEGMENTS have midpoints!*

Question: *Would it be possible to locate the midpoint of a line or ray?*

Midpoint of a segment - the point that divides a segment into 2 congruent segments.



If AM = MB then M is the midpoint of AB

If M is the midpoint of AB then AM = MB

REMEMBER! Definitions are reversible.

Every segment has exactly ONE midpoint.

Definition:

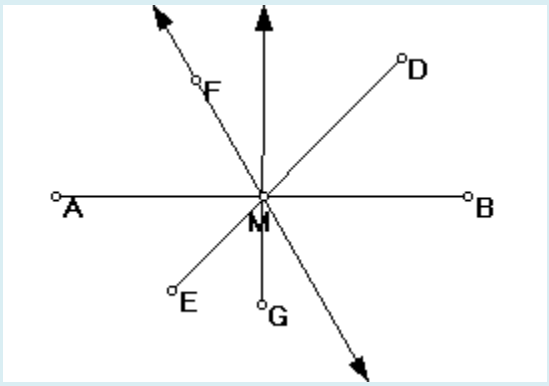
Two points (or segments, rays, or lines) that divide a segment into three congruent segments TRISECT the segment. The two points are called the TRISECTION POINTS of the segment.

Question: *Would it be possible to find two points on a ray (or line) that divide it into three congruent segments?*

Trisect - If a SEGMENT is divided into 3 congruent segments, then it is said to be *trisected*.

AB = BC = CD

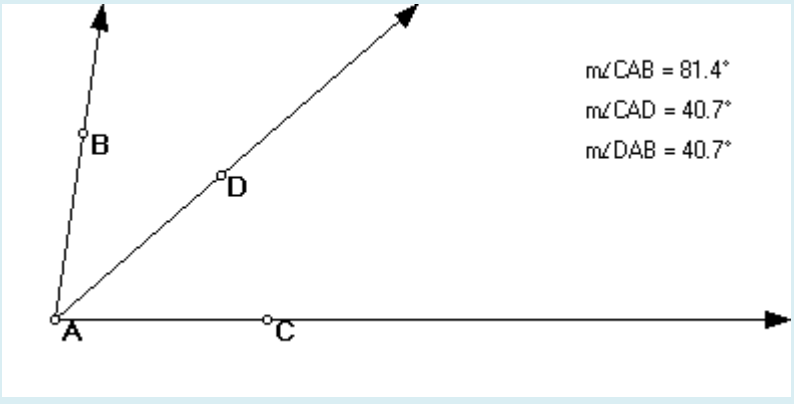
Bisector of a Segment- *Any line, ray, segment or plane that intersects a segment only at its midpoint is the bisector of the segment.*



$\overleftrightarrow{GM}$, $\overline{DE}$, $\overleftrightarrow{FM}$ are all bisectors of the segment

ANGLE Bisector - *The bisector of an angle is the ray that divides the angle into two congruent angles.*

NOTE: *Every angle has exactly one bisector.*



Trisect - If an ANGLE is trisected, then two rays have divided the angle into 3 congruent angles. *The rays are said to be* ***trisectors*** *of the angle.*

CAUTION!
A ***common error*** *in proofs is when students confuse the two:* ***segment versus angle bisection or trisection.***

- *Be alert to which is the case*
- *Be specific about what geometric parts are in play (point, ray, etc.)*
- *And be VERY clear about whether it is a segment OR angle that is involved in the bisection or trisection situation.*