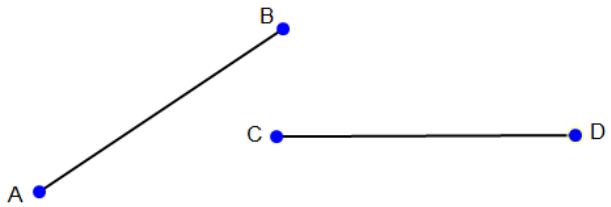
Congruent Segments

In the figure below, the two segments $\overline{AB}$ *and* $\overline{CD}$ have the same length. The segment are said to be congruent. The symbol for congruence is $\cong$ .The symbol $\ncong$ is read "is not congruent to".



Definition 1

Congruent (≅) segments are segments that have the same length.

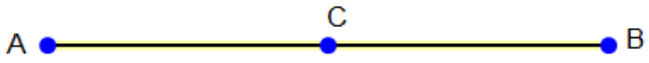
$\overline{AB}$ *and* $\overline{CD}$ **is read "is** $\overline{AB}$ **congruent to** $\overline{CD}$**".**

In the figure, marking sticks (tick marks) are used to indicate that $\overline{AB}$ and $\overline{CD}$ are congruent.
You should not assume congruence of segments unless they are indicated as congruent.

By definition, ***congruent segments*** are segments that have the ***same length***. Therefore, the statements $\overline{AB}$ *and* $\overline{CD}$ and AB = CD are equivalent.

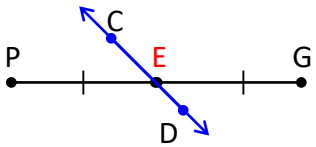
Definition 2

The midpoint, C of $\overline{AB}$ **is the point between A and B such that AC = CB.**



Definition 3

A segment bisector is a line that divides a segment into two congruent parts. The point where a bisector intersects a segment is the midpoint of the segment.



$\overleftrightarrow{CD}$ bisect $\overline{PG}$ at E

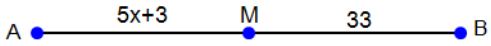
$\Rightarrow$ E is the midpoint of $\overline{PG}$

$\Rightarrow \overline{PE} \cong \overline{EG}$

Postulate 1: Midpoint Postulate

A segment has one and only one midpoint.

Example 1: M is the midpoint of $\overline{AB}$. Find the value of *x*.



M is the midpoint of $\overline{AB}$

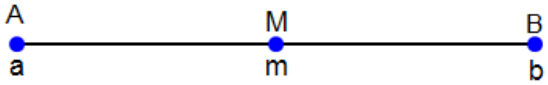
AM = MB
$5x + 3 = 33$
$5x = 30$
$x = 6$

It is possible to find the coordinate of the midpoint of a segment when the coordinates of the endpoints are given.

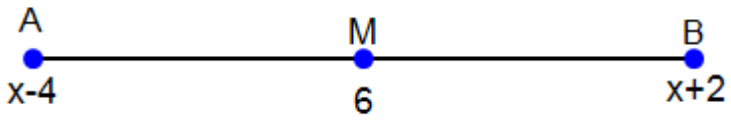
The general formula for finding the coordinate of the midpoint of a segment when the coordinates of the endpoints are given is stated below.

Midpoint Formula

The coordinate, m, of the midpoint of a line segment whose endpoints have coordinates a and b is $m = \frac{a+b}{2}$.



Example 2: M is the midpoint of AB. Find the coordinates of points A and B.



$$6 = \frac{x-4+x+2}{2}$$

$$6 = \frac{2x-2}{2}$$

$$12 = 2x - 2$$

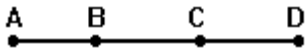
$$14 = 2x$$

$$7 = x$$

Coordinate of point A: x-4=7-4=3

Coordinate of point B: x+2=7+2=9

Example 3:



Given: AB=BC, C is the midpoint of BD

Prove: AB=CD

Statements	Reasons
1) AB=BC	1) Given
2) BC=CD	2) Definition of a midpoint
3) AB=CD	3) Transitive