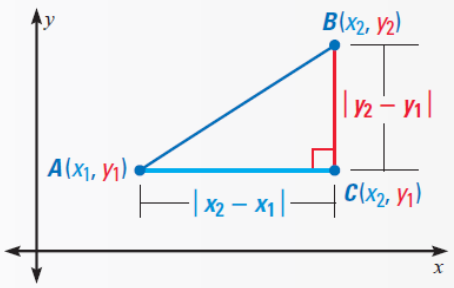
Notes 6.3 Midpoint and Distance Formula

The **Distance Formula** is a formula for computing the distance between two points in a *coordinate* plane.

THE DISTANCE FORMULA

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$



Segments that have the same length are called **congruent segments.**

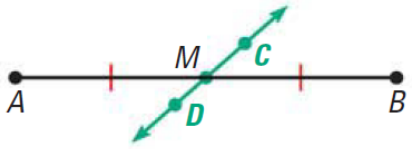
There is a special symbol, $\cong$, for indicating *congruence*.

LENGTHS ARE EQUAL.	SEGMENTS ARE CONGRUENT.
$AB = AD$	$\overline{AB} \cong \overline{AD}$
"is equal to"	"is congruent to"

Remember: Numbers are equal (=) and figures are congruent ($\cong$).

MIDPOINTS AND BISECTORS The **midpoint** of a segment is the point that divides the segment into two congruent segments. A **segment bisector** is a point, ray, line, line segment, or plane that intersects the segment at its midpoint. A midpoint or a segment bisector *bisects* a segment.

***M* is the midpoint of $\overline{AB}$.**
So, $\overline{AM} \cong \overline{MB}$ and *AM* = *MB*.



$\overleftrightarrow{CD}$ is a segment bisector of $\overline{AB}$.
So, $\overline{AM} \cong \overline{MB}$ and *AM* = *MB*.

The Midpoint Formula

The coordinates of the midpoint of a segment are the averages of the x-coordinates and of the y-coordinates of the endpoints.

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint M of $\overline{AB}$ has coordinates

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right).$$