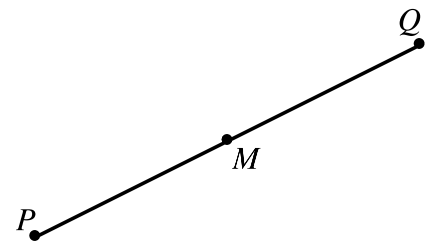
Section 1.5
Midpoint and Segment Congruence

Objective To find the midpoint of a segment, and
to complete proofs involving segment theorems.

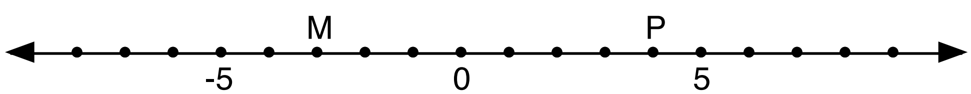
Definition of Midpoint The midpoint M of $\overline{PQ}$ is the point between P and Q such that $PM = MQ$.



Midpoint Formula

1. On a number line, the coordinates of the midpoint of a segment whose endpoints have coordinates a and b is $\frac{a+b}{2}$.
2. In a coordinate plane, the coordinates of the midpoint of a segment whose endpoints have coordinates (x_1, y_1) and (x_2, y_2) are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

1. Use the number line to find the coordinates of the midpoint of $\overline{PM}$.



2. Find the coordinates of the midpoint of $\overline{VW}$ for V(3,-6) and W(7,2).

3. The midpoint of $\overline{RQ}$ is P(4,-1). What are the coordinates of R if Q is at (3,-2).

4. U is the midpoint of $\overline{XY}$. If XY = 16x-6 and UY = 4x+9, find the value of x and the measure of $\overline{XY}$.

Any segment, line, or plane that intersects a segment at its midpoint is called a **segment bisector**.

In the study of geometry, definitions, postulates, and undefined terms are accepted as true without verification or proof. These three types of statements can be used to prove that other statements called **theorems** are true.

Midpoint Theorem If M is the midpoint of $\overline{AB}$, then $\overline{AM} \cong \overline{MB}$.

In Geometry, we will study and use various types of proof. A **proof** is a logical argument in which each statement you make is backed up by a statement that is accepted as true. One type of proof is called a **paragraph** or **informal proof**.

Example: In the figure below, B is the midpoint of $\overline{AC}$, D is the midpoint of $\overline{AB}$, and E is the midpoint of $\overline{BC}$. Show that $AC = 4AD$.