1.3 Use Midpoint and Distance Formulas

Day 1: Midpoint

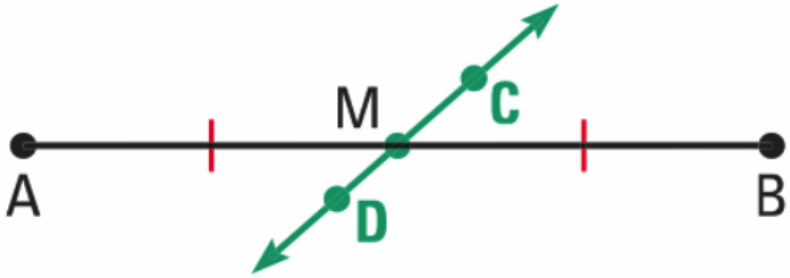
Day 2: Distance

***midpoint-** The midpoint of a segment is the point that divides the segment into two congruent segments

***segment bisector-** A point, ray, line, line segment, or plane that intersects the segment at its midpoint

**A midpoint or segment bisects a segment

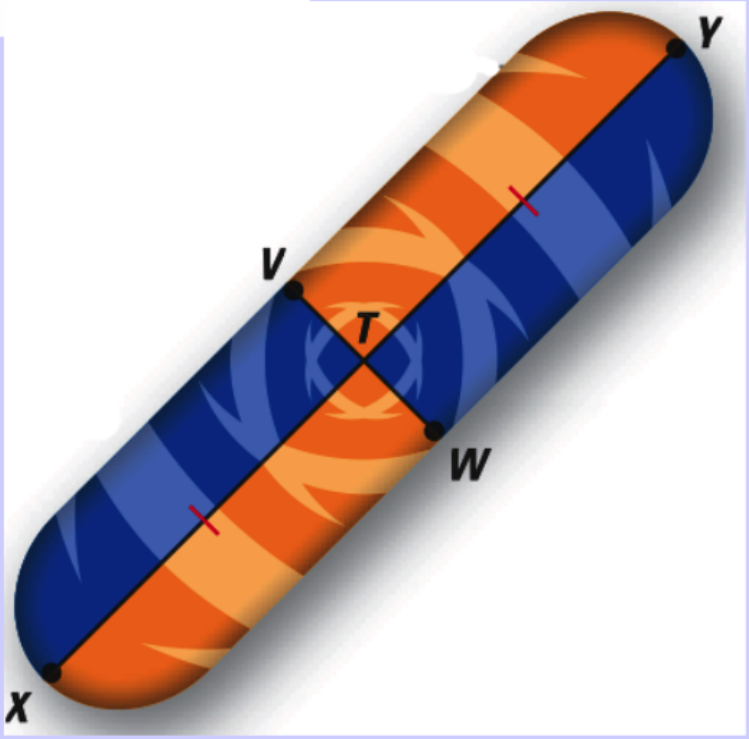
***M* is the midpoint of $\overline{AB}$.**
So, $\overline{AM} \cong \overline{MB}$ and *AM* = *MB*.



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

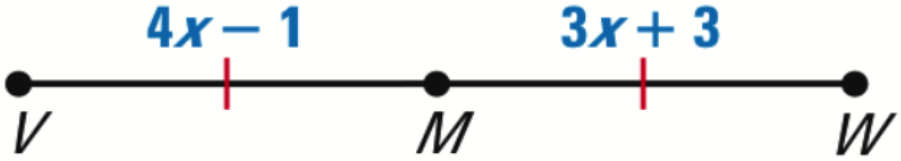
EXAMPLE 1 Find segment lengths

SKATEBOARD In the skateboard design, $\overline{VW}$ bisects $\overline{XY}$ at point T, and $XT = 39.9$ cm. Find XY.



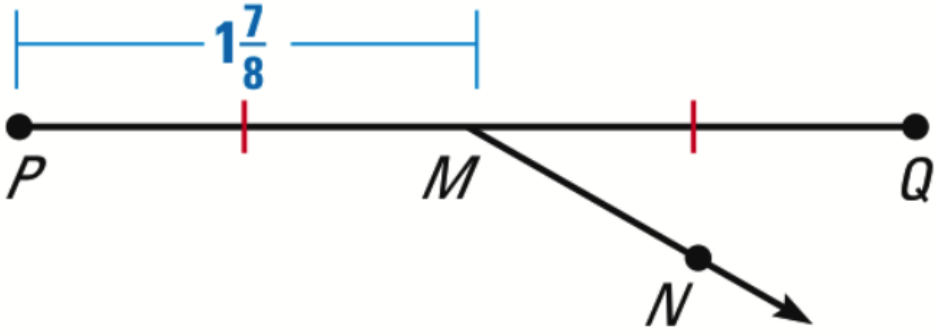
EXAMPLE 2 Use algebra with segment lengths

ALGEBRA Point M is the midpoint of $\overline{VW}$. Find the length of $\overline{VM}$.



In Exercises 1 and 2, identify the segment bisector of $\overline{PQ}$. Then find PQ.

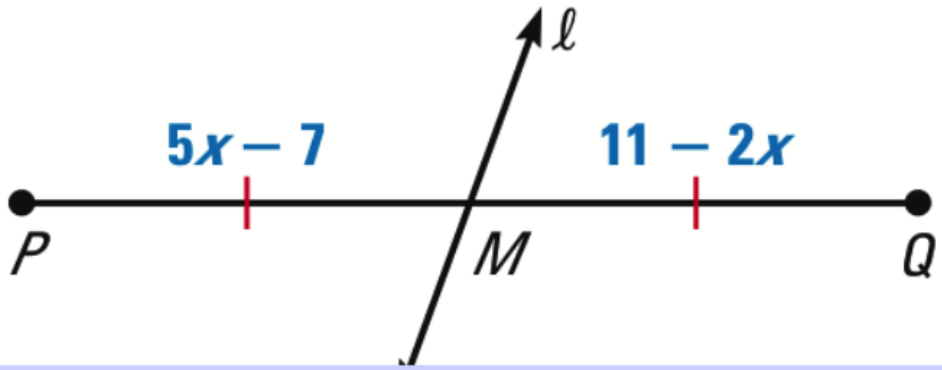
1.



Segment Bisector: _____

PQ: _____

2.



Segment Bisector: _____

PQ: _____

KEY CONCEPT

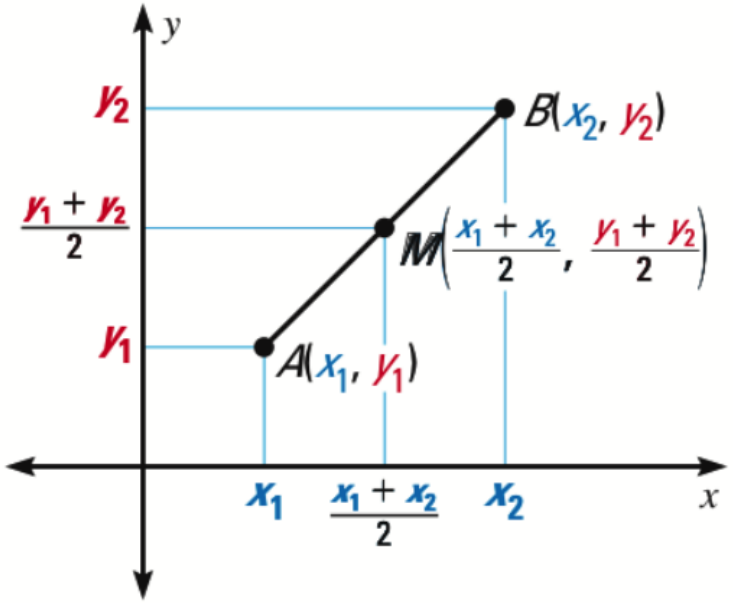
For Your Notebook

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

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



EXAMPLE 3 Use the Midpoint Formula

a. FIND MIDPOINT The endpoints of $\overline{RS}$ are $R(1, -3)$ and $S(4, 2)$. Find the coordinates of the midpoint M.

EXAMPLE 3 Use the Midpoint Formula

b. FIND ENDPOINT The midpoint of $\overline{JK}$ is $M(2, 1)$. One endpoint is $J(1, 4)$. Find the coordinates of endpoint K.

Day 1 Assignment:

p. 19 (2-22 all, 25-27 all)

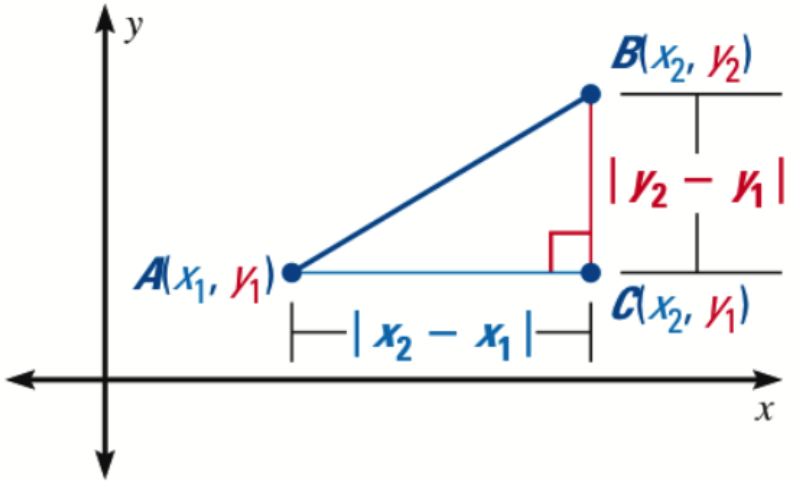
Day 2: Distance Formula

KEY CONCEPT *For Your Notebook*

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

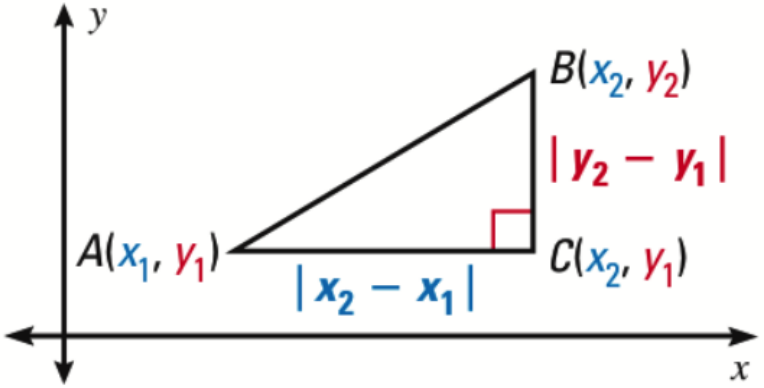
$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$



The Distance Formula is based on the *Pythagorean Theorem*, which you will see again when you work with right triangles in Chapter 7.

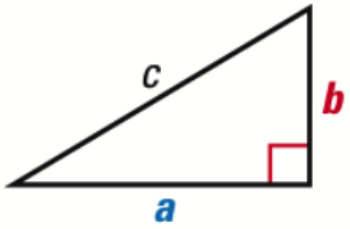
Distance Formula

$$(AB)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$



Pythagorean Theorem

$$c^2 = a^2 + b^2$$



EXAMPLE 4 Standardized Test Practice

What is the approximate length of $\overline{RS}$ with endpoints $R(2, 3)$ and $S(4, -1)$?

(A) 1.4 units (B) 4.0 units (C) 4.5 units (D) 6 units

Day 2 Assignment:

p. 20 (31-43 all, 48, 49, 55-64 all)

Quiz tomorrow! Sections 1-3!
Practice quiz on p. 22 (1-8)

Know your terms, how they are named, what symbols we use. Know the midpoint formula and distance formula and how to use them. Know how the segment addition postulate works.