Geometry Lesson 11

Objective: TSW use find midpoints of line segments.

For two points on a number line A and B, the midpoint of $\overline{AB}$ is the point that is _____
from both A and B. For point C to be equidistant from A and B means that the distance from A to C is the _____
as the distance from B to C.

Midpoint on a Number Line - The midpoint C of $\overline{AB}$ has a coordinate that is the average of the coordinates of A and B:

_____

A   C   B

The midpoint of $\overline{AB}$ on a coordinate plane is the point M on $\overline{AB}$ that is _____ from A and B. To
find the midpoint of a segment on a coordinate plane, use the midpoint formula given below.

Midpoint on a Coordinate Plane - The midpoint M of $\overline{AB}$ with endpoints $A(x_1, y_1)$ and $B(x_2, y_2)$, has coordinates that
are given by the formula:

_____

$A(x_1, y_1)$

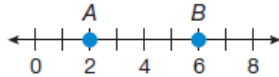$M\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

$B(x_2, y_2)$
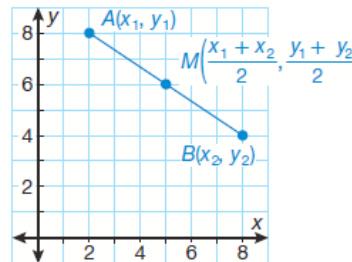
Math Reasoning

Formulate Describe how
the midpoint formula
can be inferred from the
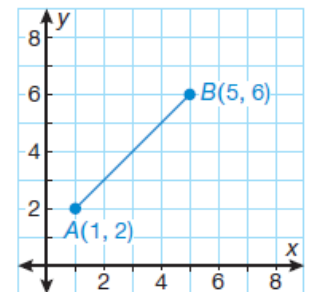formula for midpoints on
a number line.

Example 1 Finding the Midpoints
   a.   What is the coordinate of the midpoint of $\overline{AB}$?

A   B

0   2   4   6   8

SOLUTION The midpoint is the coordinate on the number line that is the average of the coordinates of the points:

b. Determine the midpoint M of $\overline{AB}$ connecting (1, 2) and (5, 6).
SOLUTION

$B(5, 6)$

$A(1, 2)$

To check, plot the point (3, 4). It should lie on $\overline{AB}$.

Also, the distance formula can be used to verify that (3, 4) is equidistant from A and B:

Example 2 Finding Midpoints of Sides
Determine the midpoint of each side of ΔMNP.
SOLUTION Use the midpoint formula to find A, the midpoint of $\overline{MN}$.

Math Reasoning

Estimate Before solving Example 2 , look at each side of the triangle and estimate where you think the midpoints might be. This is a useful way to check your answer. How close were your estimates to the actual values?
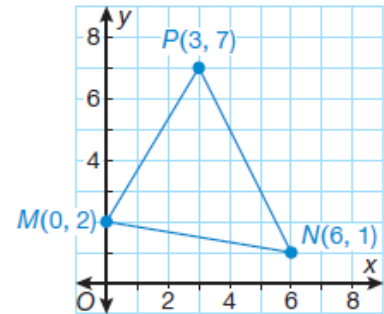
Similarly, the midpoints B of $\overline{NP}$ and C of $\overline{MP}$ have coordinates:

Example 3 Application: Navigation
A fishing boat dropped its anchor equidistant from Cape Spirit and Endeavor Rock Lighthouse, on the segment joining the two locations. Find the coordinates of the boat.
SOLUTION Let point T represent the location of the boat. Point T is the midpoint of the segment with endpoints (-3, 2) and (3, -3).
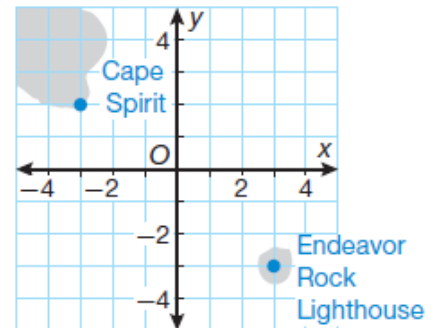
Draw the location of the boat on the diagram.

You Try!!!!

d. Determine the coordinates of the midpoint of each side of ΔJKL.