Lesson 9-6

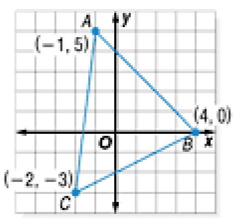
Example 1 Use the Distance Formula
Find the distance between *M*(1, 5) and *N*(-3, 2). Round to the nearest tenth, if necessary.

Use the Distance Formula.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_2)^2}$	Distance Formula
$MN = \sqrt{(-3-1)^2 + (2-5)^2}$	$(x_1, y_1) = (1, 5)$, $(x_2, y_2) = (-3, 2)$
$MN = \sqrt{(-4)^2 + (-3)^2}$	Simplify.
$MN = \sqrt{16+9}$	Evaluate $(-4)^2$ and $(-3)^2$.
$MN = \sqrt{25}$	Add 9 and 16.
$MN = 5$	Take the square root.

The distance between points *M* and *N* is 5 units.

Example 2 Use the Distance Formula to Solve a Problem
GEOMETRY Find the perimeter of ΔABC to the nearest tenth.



$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Distance Formula
$AB = \sqrt{(4-(-1))^2 + (0-5)^2}$	$(x_1, y_1) = (-1, 5)$, $(x_2, y_2) = (4, 0)$
$AB = \sqrt{(5)^2 + (-5)^2}$	Simplify.
$AB = \sqrt{25+25}$	Evaluate 5^2 and $(-5)^2$.
$AB = \sqrt{50}$	Add 25 and 25.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Distance Formula
$BC = \sqrt{(-2-4)^2 + (-3-0)^2}$	$(x_1, y_1) = (4, 0)$, $(x_2, y_2) = (-2, -3)$
$BC = \sqrt{(-6)^2 + (-3)^2}$	Simplify.
$BC = \sqrt{36+9}$	Evaluate $(-6)^2$ and $(-3)^2$.
$BC = \sqrt{45}$	Add 36 and 9.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Distance Formula
$CA = \sqrt{(-1-(-2))^2 + (5-(-3))^2}$	$(x_1, y_1) = (-2, -3)$, $(x_2, y_2) = (-1, 5)$
$CA = \sqrt{1^2 + 8^2}$	Simplify.
$CA = \sqrt{1+64}$	Evaluate 1^2 and 8^2.
$CA = \sqrt{65}$	Add 1 and 64.

Then add the lengths of the sides to find the perimeter.

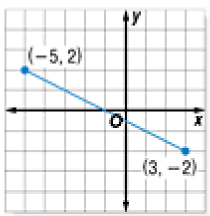
$\sqrt{50} + \sqrt{45} + \sqrt{65} \approx 7.071 + 6.708 + 8.062$

≈ 21.841

The perimeter is about 21.8 units.

Example 3 Use the Midpoint Formula

Find the coordinates of the midpoint of $\overline{MN}$.



midpoint $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	Midpoint Formula
$= \left(\frac{-5+3}{2}, \frac{2+(-2)}{2}\right)$	Substitution
$= (-1, 0)$	Simplify.

The coordinates of the midpoint of $\overline{MN}$ are (-1, 0).