Lesson 11-5

Example 1 Distance Between Two Points
Find the distance between the points at (-1, 5) and (8, -7).

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance Formula

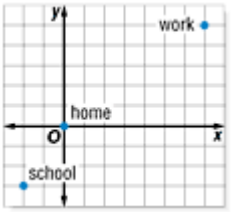
$= \sqrt{(8 - (-1))^2 + (-7 - 5)^2}$ $(x_1, y_1) = (-1, 5)$ and $(x_2, y_2) = (8, -7)$

$= \sqrt{(9)^2 + (-12)^2}$ Simplify.

$= \sqrt{225}$ Evaluate squares and simplify.

$= 15$ units

Example 2 Use the Distance Formula to Solve a Problem
Hai walks 5 blocks north then 7 blocks east to get from his home to work. To get from his home to school, he walks 3 blocks south then 2 blocks west. If he were able to walk the shortest possible distance from school to work, how far would he walk?



Draw a model of the situation on a coordinate grid.
If his home is at (0, 0), then the location of his work is (7, 5). The location of his school is (-2, -3). Use the Distance Formula.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance Formula

$= \sqrt{(7 - (-2))^2 + (5 - (-3))^2}$ $(x_1, y_1) = (-2, -3)$, $(x_2, y_2) = (7, 5)$

$= \sqrt{(9)^2 + (8)^2}$ Simplify.

$= \sqrt{145}$ or about 12 blocks

Example 3 Find a Missing Coordinate
Find the value of *r* if the distance between the points at (-6, *r*) and (-2, 3) is $2\sqrt{5}$.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance Formula

$2\sqrt{5} = \sqrt{(-2 - (-6))^2 + (3 - r)^2}$ Let $x_2 = -2$, $x_1 = -6$, $y_2 = 3$, $y_1 = r$, and $d = 2\sqrt{5}$

$2\sqrt{5} = \sqrt{(4)^2 + (3 - r)^2}$

$2\sqrt{5} = \sqrt{16 + 9 - 6r + r^2}$ Evaluate squares.

$2\sqrt{5} = \sqrt{r^2 - 6r + 25}$ Simplify.

$(2\sqrt{5})^2 = (\sqrt{r^2 - 6r + 25})^2$ Square each side.

$20 = r^2 - 6r + 25$ Simplify.

$0 = r^2 - 6r + 5$ Subtract 20 from each side.

$0 = (r - 1)(r - 5)$ Factor.

$r - 1 = 0$ or $r - 5 = 0$ Zero Product Property

$r = 1$ $r = 5$

The value of *r* is 1 or 5.