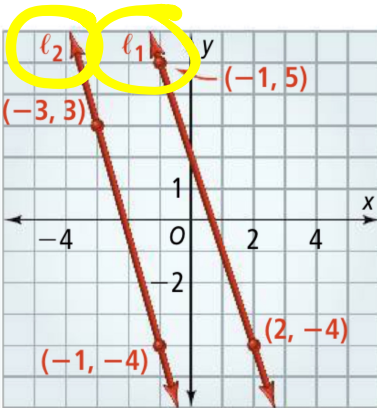# Slopes of Parallel and Perpendicular Lines

Note: Parallel lines have equal slopes.

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-

Ex 1a) Are line 1 and line 2 parallel? Explain.

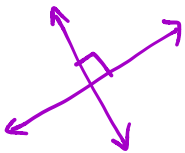**Ex 1b)** Line 3 contains the points A(-13,6) and B(-1,2). Line 4 contains the points C(3,6) and D(6,7). Are line 3 and line 4 parallel? Explain.

Ex 2a) What is an equation of the line parallel to
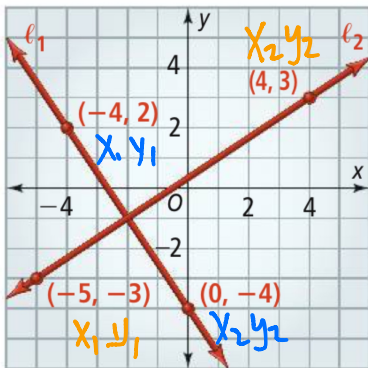$y = -3x - 5$ and contains $(-1, 8)$?

Ex 2b) What is an equation of the line parallel to
$y = -x - 7$ and contains $(-5, 3)$?

Note: When two lines are perpendicular their slopes are opposite reciprocal fractions (or the product of their slopes is -1).

Ex) $M = -3$ and $M = \frac{1}{3}$ are opposite reciprocal slopes.

**Ex 3a)** Are line 1 and line 2 perpendicular? Explain.

ℓ_1 y $x_2 y_2$ ℓ_2

4   (4, 3)

(−4, 2)   2

$x_1 y_1$

−4   O   2   4 x

−2

(−5, −3)   (0, −4)

$x_1 y_1$ $x_2 y_2$

Ex 3b) Line 3 contains the points A(2,7) and B(3,-1). Line 4 contains the points C(-2,6) and D(8,7). Are line 3 and line 4 perpendicular? Explain.
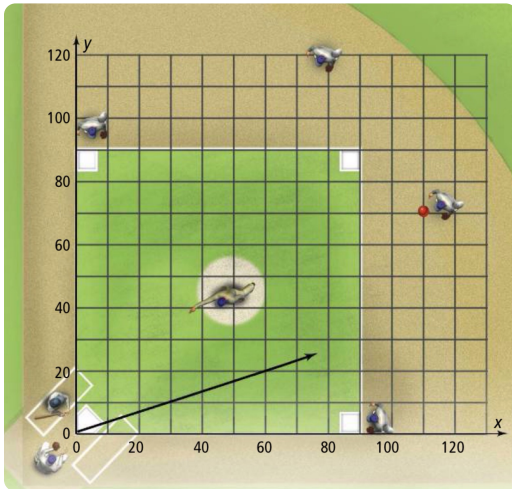
.

Ex 4a) What is an equation of the line perpendicular to y= -3x - 5 and contains (-3,7)?

Ex 4b) What is an equation of the line perpendicular to $y = \frac{1}{5}x + 2$ and contains $(15, -4)$?

Ex 5a) The baseball field below is on a coordinate grid with home plate at the origin. A batter hits a ground ball along the line shown. The player at (110,70) runs along a path perpendicular to the path of the ball. What is the equation of the line on which the player runs?

(60,20)

(30,10)
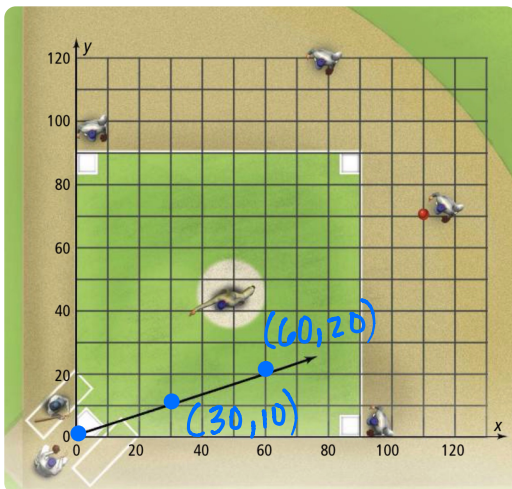
Ex 5b) Suppose a second player standing on (90, 40) misses the ball, turns around, and runs on a path parallel to the baseball's path. What is an equation of the line parallel to the baseball's path?

LESSON CHECK

Lesson Check

Do you know HOW?

$\overleftrightarrow{AB}$ contains points A and B. $\overleftrightarrow{CD}$ contains points C and D. Are $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ *parallel*, *perpendicular*, or *neither*? Explain.

1. $A(-8, 3)$, $B(-4, 11)$, $C(-1, 3)$, $D(1, 2)$
2. $A(3, 5)$, $B(2, -1)$, $C(7, -2)$, $D(10, 16)$
3. $A(3, 1)$, $B(4, 1)$, $C(5, 9)$, $D(2, 6)$

4. What is an equation of the line perpendicular to $y = -4x + 1$ that contains $(2, -3)$?

Do you UNDERSTAND? MATHEMATICAL PRACTICES

5. **Error Analysis** Your classmate tries to find an equation for a line parallel to $y = 3x - 5$ that contains $(-4, 2)$. What is your classmate's error?

> slope of given line = 3
> slope of parallel line = $\frac{1}{3}$
> $y - y_1 = m(x - x_1)$
> $y - 2 = \frac{1}{3}(x + 4)$

(4)

Homework:
Lesson 3-8 Worksheet