# 5.4 Special Cases



$(x, y)$

$(-3, 2)$

one Solution

solve and get x or y and then find the other coordinate

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Same Slope



different y-int.
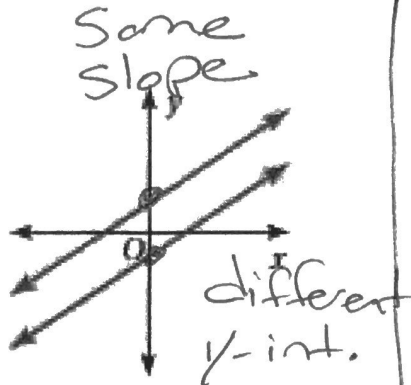
Parallel Lines

No Solution

If you solve the system, you'll get something like
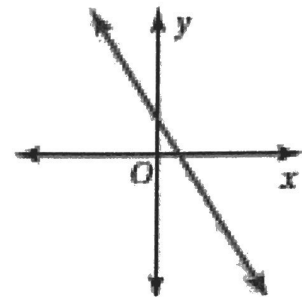
$3 = -8$

or

$5 = 0$

This means No Solution

$y = -5x + 8$

$y = -5x + 2$

↗ same Slope    ↑ diff y-int

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Same Line

Infinite Solutions

If you solve the system and get something like

$0 = 0$

$6x + 3 = 6x + 3$

This means ∞ solutions

$5x - 3y = 2$

$10x - 6y = 4$

✱ same Equation

# One Solution

## Two lines intersect at one Point

$$-3x + 2y = -6$$
$$4x - 2y = 10$$

$$(4, 3)$$

$$y = -5x - 7$$
$$y = 10x + 8$$

$$(-1, -2)$$

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## No Solution

**Solve the system.**   $y = 3x + 1$
                        $y = 3x - 3$

$$3x + 1 = 3x - 3$$
$$-3x \quad\quad -3x$$
$$1 = -3 \quad \text{No!}$$



$y = 3x + 1$

$y = 3x - 3$
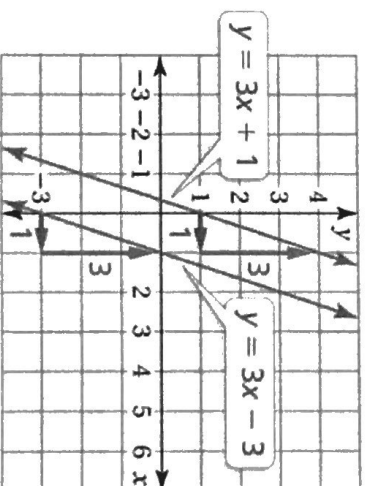
## No Solution

Check Slope and y-Intercept:

Same slope but different y-intercept means Parallel.

**1.** $y = -x + 3$
   $y = -x + 5$

same ↑ diff. ↑

No Solution

**2.** $y = -5x - 2$
   $5x + y = 0$

$$5x + y = 0$$
$$-5x \quad -5x$$
$$y = -5x + 0$$

No Solution

# Infinitely Many Solutions

$2\left(\begin{array}{l}3x + 5y = 7\end{array}\right)$
$6x + 10y = 14$

SAME!

$\infty$ solutions

$\left(\begin{array}{l}4y = 16x - 20\end{array}\right) \div 4$
$y = 4x - 5$

SAME!

$\infty$ solution

$3\left(12x + 8y = 18\right)$
$-2\left(18x + 12y = 27\right)$

$36x + 24y = 54$
$-36x - 24y = -54$
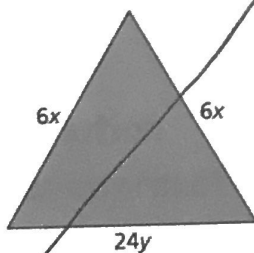_____
$0 + 0 = 0$
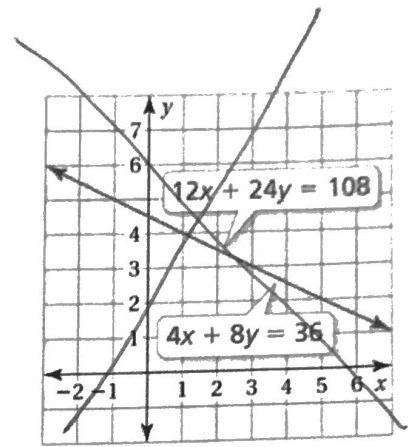$0 = 0$

$\infty$ solutions

# Infinitely Many Solutions
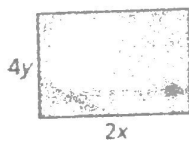
The perimeter of the rectangle is 36 units. The perimeter of the triangle is 108 units. Write and solve a system of linear equations
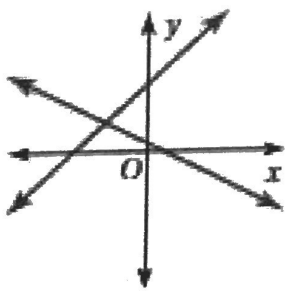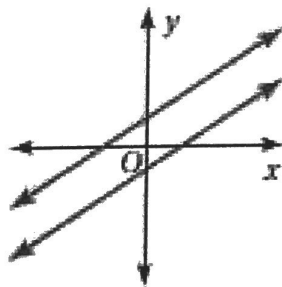
Perimeter of Rectangle          Perimeter of Triangle

4y

2x

6x    6x

24y

$12x + 24y = 108$

$4x + 8y = 36$

# 5.4 Special Cases
# Interpreting Solutions



**One Solution**

The lines intersect

$X = -7$

$Y = -9$

$(-7, -9)$



**NO Solution**

The lines are parallel

Same slope
diff. y-int.

oR

$4 = -12$

$8 = 0$

No!
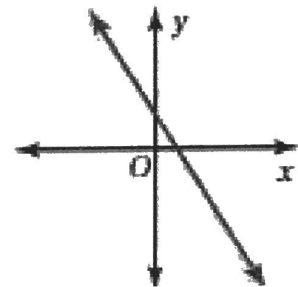


**Infinitely Many Solutions**

The lines are the same

SAME
LINES

oR

$0 = 0$

oR

$12x + 4 = 12x + 4$