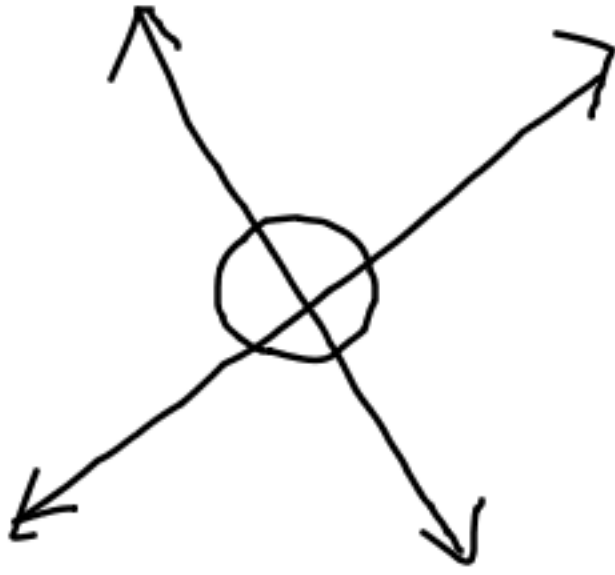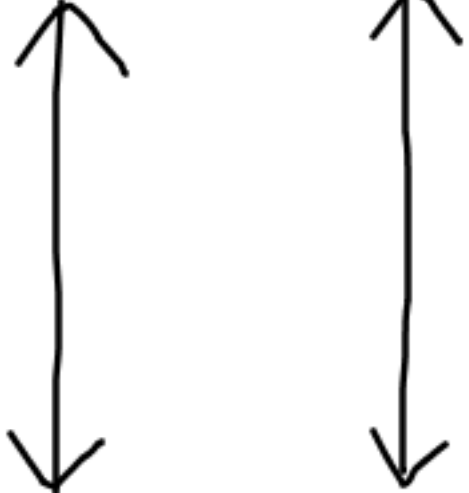# Solving Linear Systems

"Solving" a Linear System means finding the point at which 2 lines intersect. A Linear System can intersect in 3 ways: **Point of Intersection**

One	None	Infinite
	parallel	Same slope (m) Same y-int (b)

We will refer to the solution as the Point of Intersection   - POI = (x, y)

In this unit, we will learn 3 ways to Solve a Linear System:
1. Solving by **Graphing**
2. Solving by **Substitution**
3. Solving by **Elimination**

Method 1: Solve by Graphing:

Steps:

1. **Graph** the 2 linear systems
2. **State the POI** (Point of Intersection) by stating "The POI is (,   )"

$$y = mx + b$$

We will refer to the solution as the Point of Intersection – POI = (x, y)

(handwritten) x-y-int is always your starting point (b)

① Change all equations to be $y = mx + b$

In this unit, we will learn 3 ways to Solve a Linear System:

(handwritten) $m = \frac{6}{2} = -4$

1. Solving by **Graphing**
2. Solving by **Substitution**
3. Solving by **Elimination**

② Graph both lines

(handwritten) $+2x \quad +2x$
$y - 2x = 4$
$y = 2x + 4$

Method 1: Solve by Graphing:

(handwritten) $m = \frac{2}{1} = \frac{2}{1}$
$b = 4$

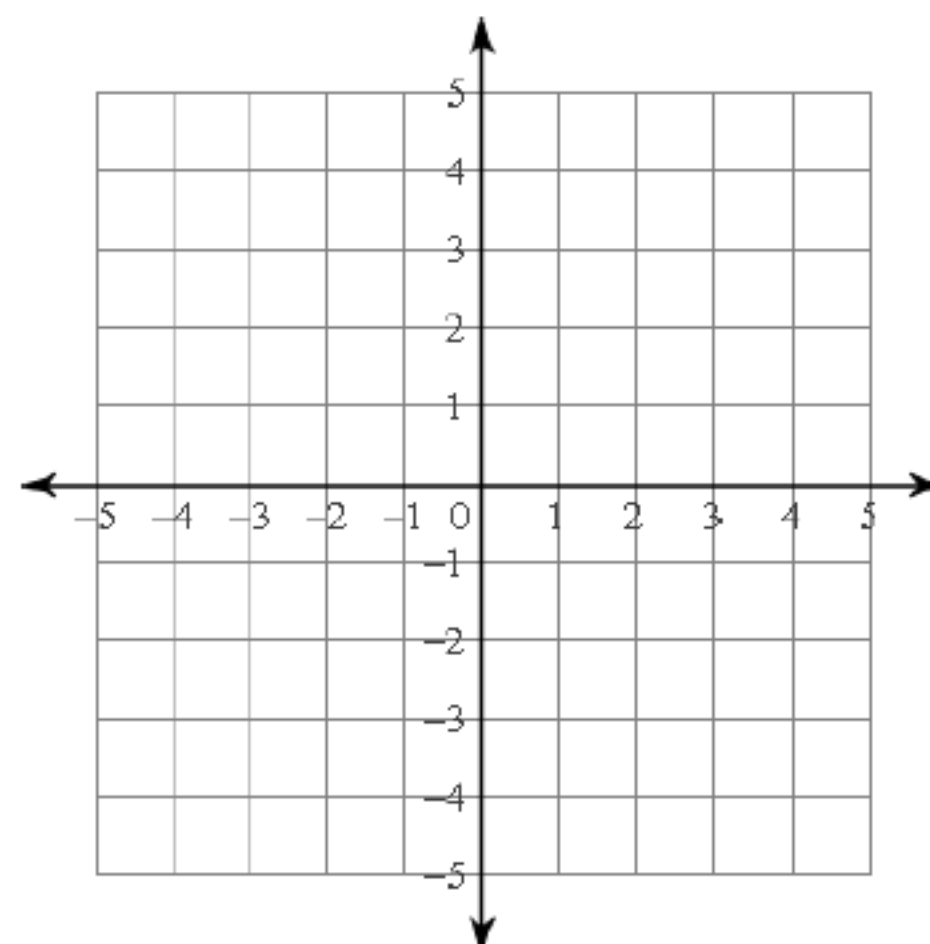*(handwritten, boxed)* ∴ POI = (-1, 2)

Steps:

1. **Graph** the 2 linear systems
2. **State the POI** (Point of Intersection) by stating "The POI is (,   )"
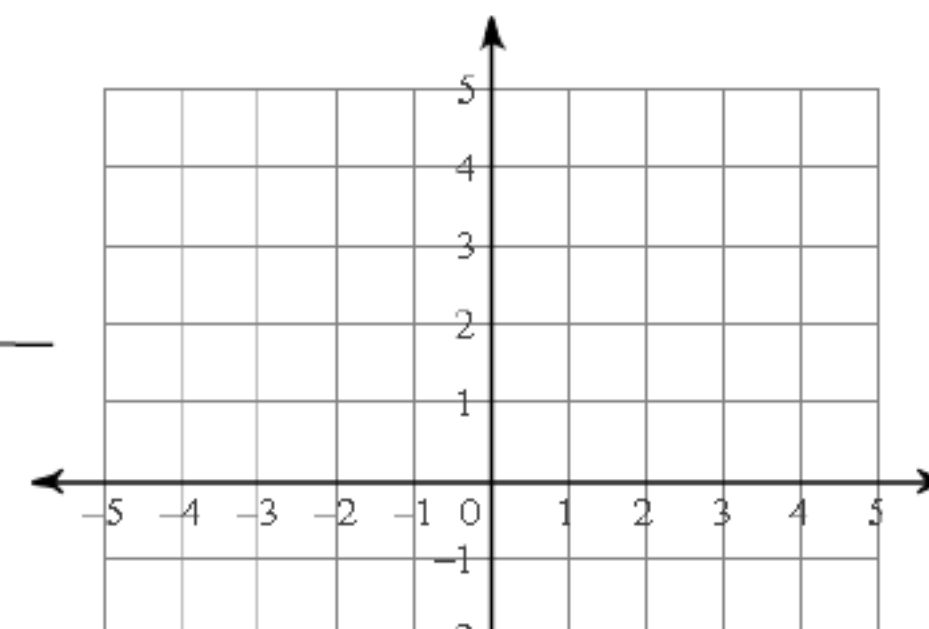
Examples

$y = -6x - 4$
$y - 2x = 4$

$y = -\frac{2}{3}x - 2$

$y = -4$

2. **State the POI** (Point of Intersection) by stating "The POI is (,   )"

Examples

$$y=-6x-4$$
$$y-2x=4$$

1) Change equations to $y=mx+b$
2) Graph the lines
3) Find the POI

* When there is no slope, your line is horizontal

$$y=-\frac{2}{3}x-2$$
$$y=-4$$

$$m=-\frac{2}{3} \| \frac{2}{3}$$
$$b=-2$$

$$m=0$$
$$b=-4$$

$$\therefore POI = (3,-4)$$

Course: Grade 10 Mathematics

A∞Ω
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Method 2: Solve by Substitution: