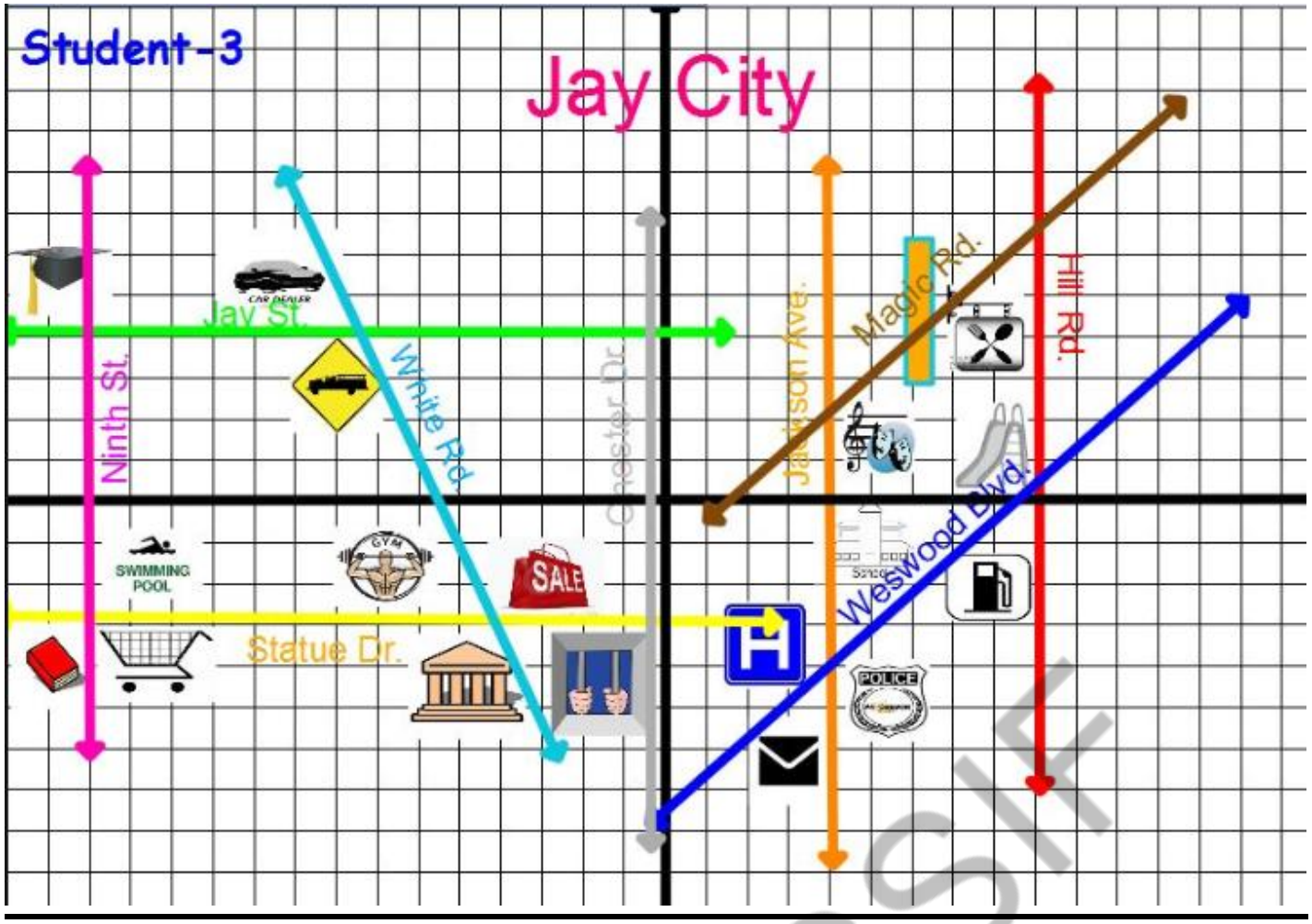
Chapter 2: System of Equations

Special Types of Lines



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Types of Lines	Example	Notes	# of solutions
COINCIDENT			
PARALLEL			
PERPENDICULAR			
SECANT			

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Ex: Find the negative reciprocal

1) 2/5

2) -6/7

3) -2

4) 3

5) 1/3

6) -1/2

7) 4/5

8) -6

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Ex: Determine the type of line: parallel, perp, secant, coin.

1) $y = -\frac{2}{3}x + 5$ & $y = \frac{3}{2}x = 6$

2) $y = -\frac{2}{3}x + 5$ & $y = -\frac{2}{3}x + 5$

3) $y = \frac{2}{3}x + 5$ & $y = \frac{3}{2}x - 6$

4) $2x + 3y = 12$ & $y = -\frac{2}{3}x + 4$

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5) $15x - 15y = 15$ & $15x - 15y = -15$

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Parallel and Perpendicular Lines

Find the equation of a line that is:

1) Parallel to $y = \frac{2}{3}x + 5$ and passes thru $(0,10)$

2) Parallel to $4x - 6y = 12$ and passes thru $(0, -20)$

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3) Parallel to $-20x + 40y = 80$ and passes thru $(-10, -20)$

4) Perpendicular to $y = -3x - 6$ and passes thru $(0,5)$

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5) Perpendicular to $4x - 6y = 12$ and passes thru $(0, -3)$

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6) Perpendicular to $5x - 6y = 30$ and passing thru $(-6, 3)$

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A _____ is a set of 2 equations or more.

Example: $\begin{cases} y = 2x + 9 \\ y = -x - 3 \end{cases}$

To _____ a system means to find the point of intersection (POI). We need to find the POINT where the 2 lines meet.

There are 4 methods of solving equations:

1. Graphing Method
2. Comparison Method
3. Substitution Method
4. **Elimination Method**

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Let's study the GRAPHING METHOD

Find the POI for $\begin{cases} y = 2x - 8 \\ y = -x + 1 \end{cases}$

Solution

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Let's study the COMPARISON METHOD

Format: $\begin{cases} y = ax + b \\ y = ax + b \end{cases}$

Both equations are in functional form

Example 1: Solve $\begin{cases} y = 2x - 8 \\ y = -x + 1 \end{cases}$

Solution: Make the 2 equations equal to each other.

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Example 2: Solve $\begin{cases} y = -\frac{2}{5}x + 10 \\ y = -\frac{1}{2}x - 6 \end{cases}$

Solution

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Let's study the SUBSTITUTION METHOD

Format: $\begin{cases} y = ax + b \\ ax + by = c \end{cases}$

Example 1: Find POI for $\begin{cases} y = 2x + 5 \\ -3x - 2y = 25 \end{cases}$

Solution: Replace the functional equation into the other one.

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Example 2: Find POI for $\begin{cases} x = 2y - 8 \\ 2x + 5y = 56 \end{cases}$

Solution:

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Example 3: Find the POI $\begin{cases} y = \frac{2}{3}x + 8 \\ 3y - 4x = 20 \end{cases}$

Solution:

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Let's study the ELIMINATION METHOD

Format: $\begin{cases} ax + by = c \\ ax + by = c \end{cases}$

Example 1: Solve $\begin{cases} 2x + 3y = 60 \\ 2x + 4y = -80 \end{cases}$

Solution:

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Example 2: Solve $\begin{cases} 2x + 6y = 80 \\ x + y = 10 \end{cases}$

Solution:

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Example 3: Find POI for $\begin{cases} -2x - 3y = 60 \\ 3x + 2y = 100 \end{cases}$

Solution:

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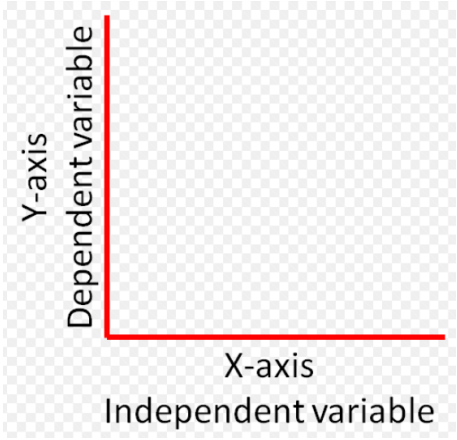
Independent vs. Dependent Variables

The _____ variable is the "thing" that can stand alone. If we increase or decrease this factor, it will impact the dependent variable.



Usually: $\begin{cases} time\ (\sharp\ of\ min, hours) \\ \sharp\ of\ students, adults \\ \sharp\ of\ cars \\ amount\ of\ products \end{cases}$

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The _____ variable relies on and feels the effect of the independent variable. It changes depending on how much of the other variable you have.

Usually: $\begin{cases} Cost \\ Price \end{cases}$

ASK YOURSELF: Which variable depends on the other?

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Examples: Name the variables.

1. The amount of time you study vs. the grade on your test.

2. Your muscle weight vs. the amount of time training at gym.

3. The amount of hockey tickets vs. the total cost.

4. The time it takes to drain a bath tub vs. the number of liters the bath tub contains.

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We will study 4 types of word problems.

TYPE 1:

Both equations are $\begin{cases} y = ax + b \\ y = ax + b \end{cases}$

'a' is the amount per $\begin{cases} hour \\ day \\ student \end{cases}$

'b' is the amount paid once

$\begin{cases} a\ membership\ to\ a\ gym \\ bonus\ at\ a\ job \end{cases}$

Solve by _____

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TYPE 2:

Both equations are $\begin{cases} ax + by = c \\ ax + by = c \end{cases}$

'c'is usually the total of the left side.

Solve by _____

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TYPE 3:

Equations are $\begin{cases} ax + by = c \\ x + y = \# \end{cases}$

Solve by _____

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TYPE 4:

Two coordinates are given $\begin{cases}(x,y)\\(x,y)\end{cases}$

Solve by finding the equation of a line

➔ Find ‘a’ by $a = \frac{y_2 - y_1}{x_2 - x_1}$

➔ Find ‘b’ by plugging in a point

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Situational Problems

In the following problems: you will be using the concepts learned so far:

- Functional form
- Parallel lines
- Perpendicular lines
- X-intercept
- Y-intercept
- Comparison Method

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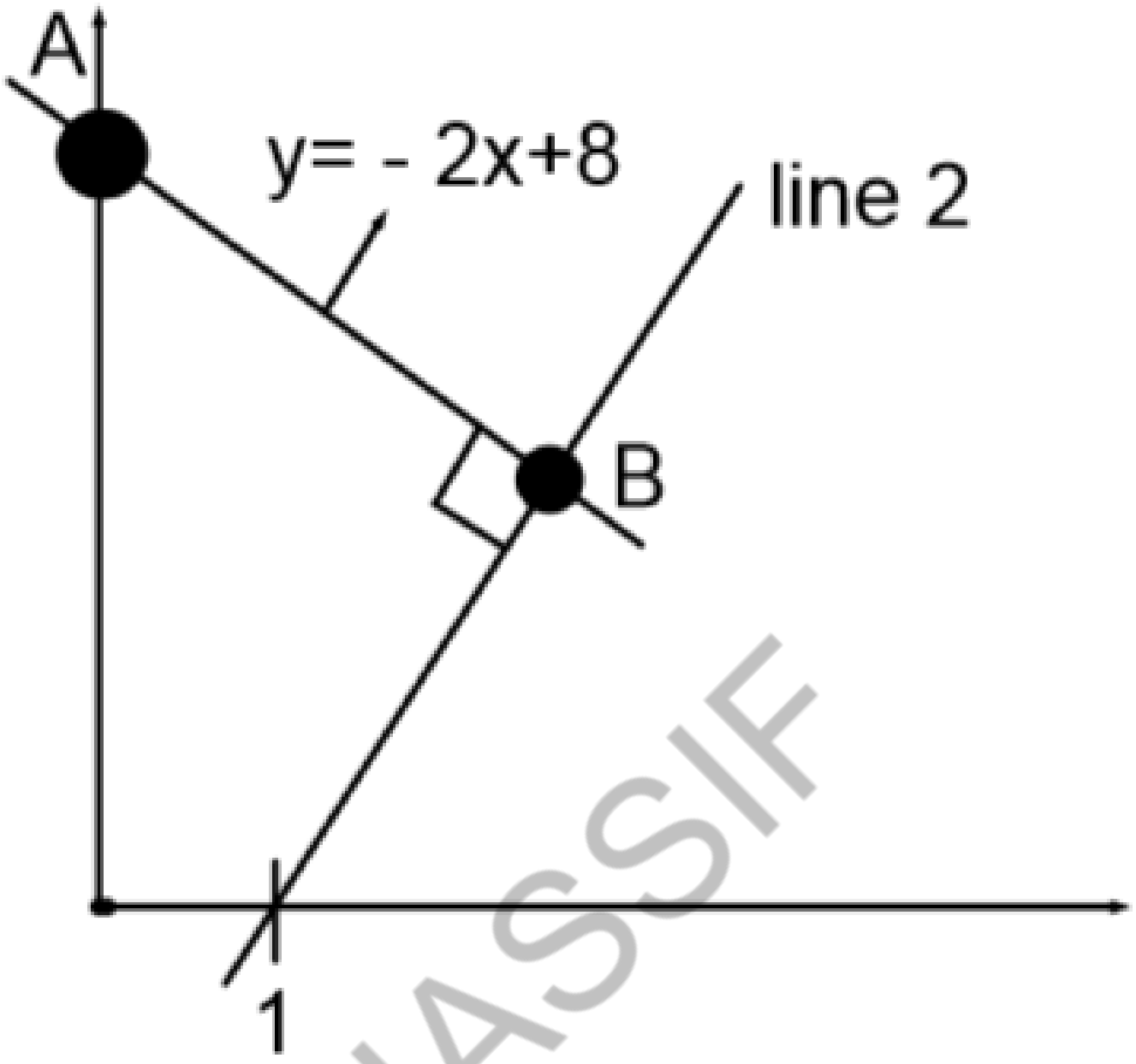
Problem 1: Determine coordinates A & B



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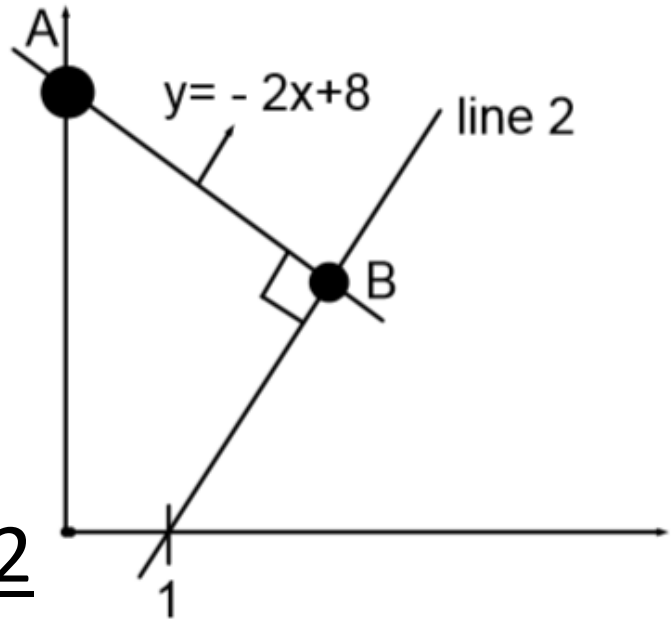
Step 1: Determine coordinate A

How?



Step 2: Determine equation line 2

How?

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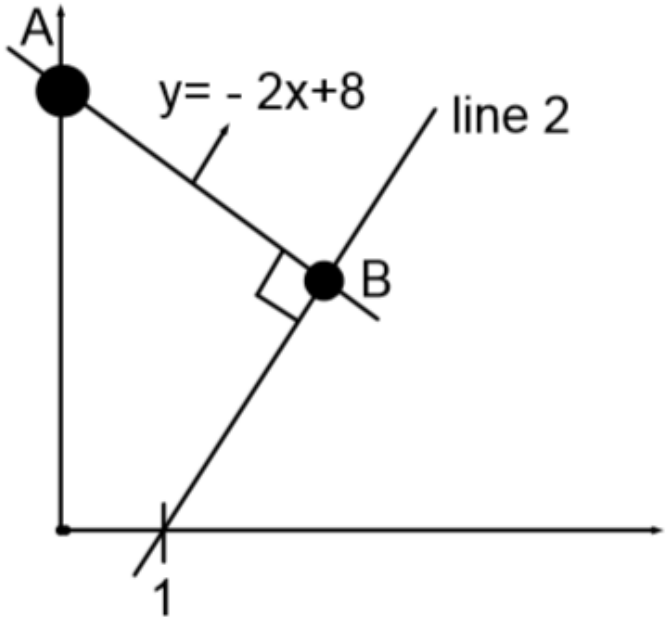
Step 3: Determine coordinate B

How?



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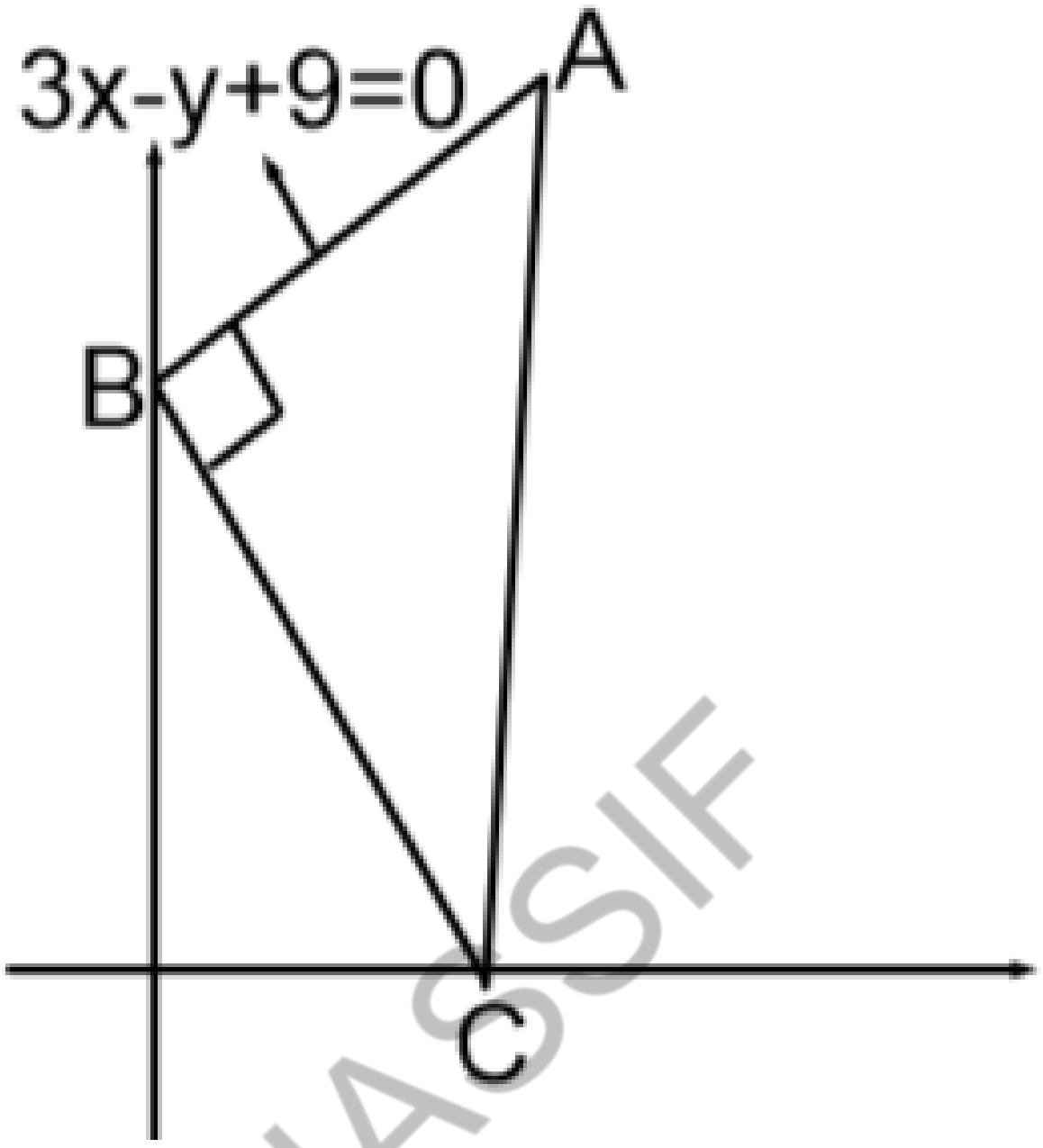
Problem 2: Determine coordinate C



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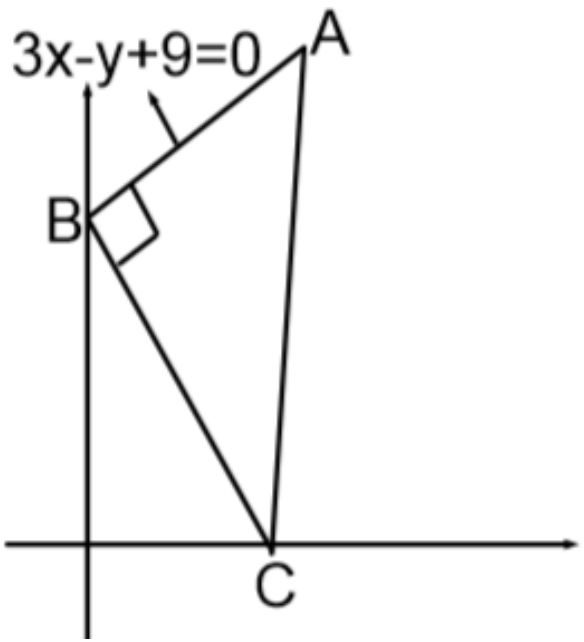
Step 1: Put equation is functional form

How?



Step 2: Determine coordinate B

How?

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Step 3: Determine equation $\overline{BC}$

How?

Step 4: Determine coordinate C

How?

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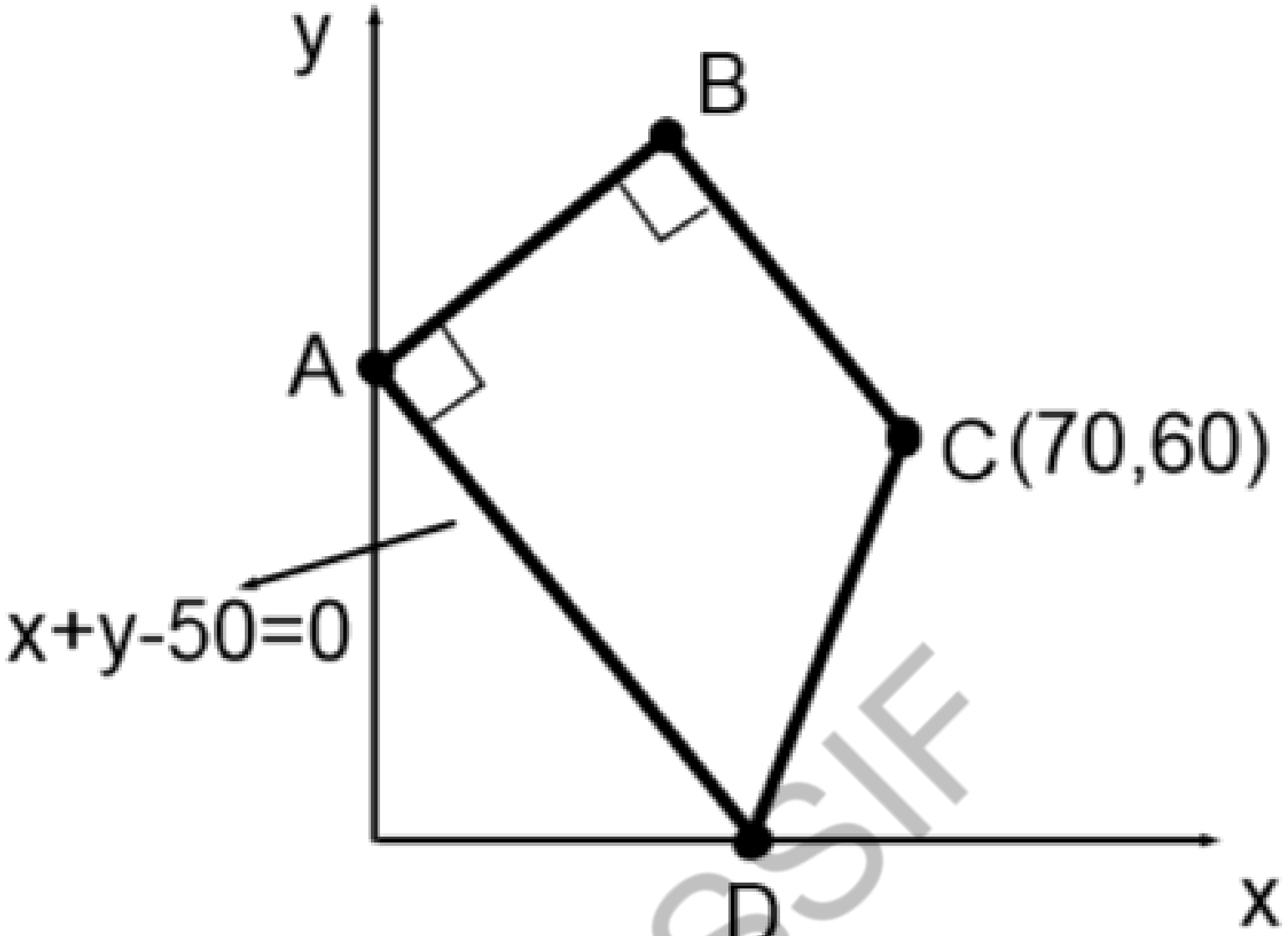
Problem 3: Find all coordinates.



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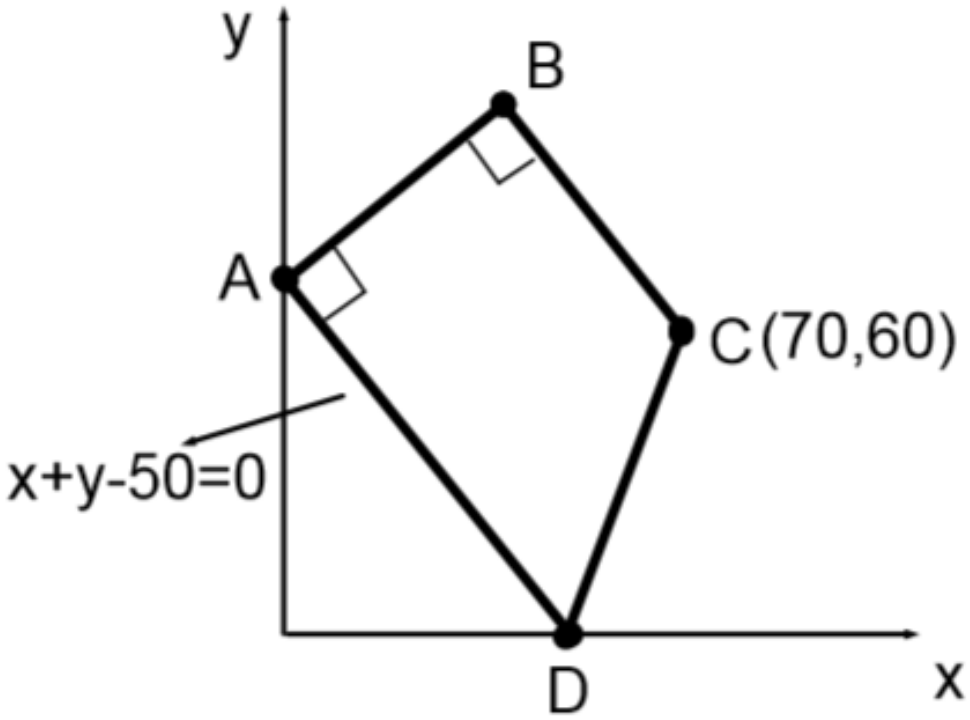
Steps



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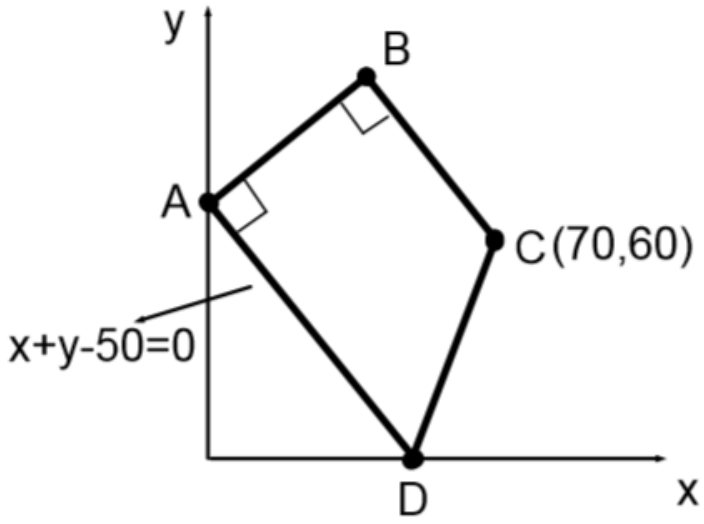

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