Unit 2: Solving Systems of Equations

Key Ideas

Summary of Methods

1) Substitution: Requires that one of the variables be isolated on one side of the equation. It is especially convenient when one of the variables has a coefficient of 1 or -1.

2) Elimination: Can be applied to any system, but it is especially convenient when a variable appears in different equations with coefficients that are opposites.

3) Graphing: Can provide a useful method for estimating a solution.

Solve the given system by substitution:

1) $2x - y = 7$

$3x + 3y = -3$

$(2, -3)$

Solve the given system by elimination:

2) $-3x + 4y = -4$

$3x - 6y = 6$

$(0, -1)$

Reasoning with Equations & Inequalities

- Understanding how to solve equations
- Solve equations and inequalities in one variable
- Solve systems of equations
- Represent and solve equations and inequalities graphically.

Important Tips

- Know the **properties of operations**
- Be familiar with the properties of equality and inequality. (Watch out for the negative multiplier.)
- Eliminate denominators (multiply by denominators to eliminate them)

Properties to know

- Addition Property of Equality
- Subtraction Property of Equality
- Multiplication Property of Equality
- Division Property of Equality
- Reflexive Property of Equality
- Symmetric Property of Equality
- Transitive Property of Equality
- Commutative Property of Addition and Multiplication
- Associative Property of Addition and Multiplication
- Distributive Property
- Identity Property of Addition and Multiplication
- Multiplicative Property of Zero
- Additive and Multiplicative Inverses

Example 1

Solve the equation $8(x + 2) = 2(y + 4)$ for y.

$$y = 4x + 4$$

Example 2

Karla wants to save up for a prom dress.

She figures she can save $9 each week from the money she earns babysitting.

If she plans to spend up to $150 for the dress, how many weeks will it take her to save enough money?

17weeks

Example 3

- **This equation can be used to find *h*, the number of hours it takes Bill and Bob to clean their rooms.**

$$\frac{h}{5}+\frac{h}{20}=1$$

$$4h+h=20$$

$$h=4$$

- **How many hours will it take them?**

Example 4

- **You are selling tickets for a basketball game. Student tickets cost $3 and general admission tickets cost $5. You sell 350 tickets and collect $1450.**
- **Use a system of linear equations to determine how many student tickets you sold?**

Student : x $\quad x + y = 350$

General : y $\quad 3x + 5y = 1450$

150 student

Example 5

You sold 52 boxes of candy for a fundraiser. The large size box sold for $3.50 each and the small size box sold for $1.75 each. If you raised $112.00, how many boxes of each size did you sell?

large : x

small : y

A. 40 large, 12 small

B. 12 large, 40 small

C. 28 large, 24 small

D. 24 large, 28 small

$$x + y = 52$$

$$3.5x + 1.75y = 112$$

Example 6

You sold 61 orders of frozen pizza for a fundraiser. The large size sold for $12 each and the small size sold for $9 each. If you raised $660.00, how many of each size did you sell?

large : x

small : y

A. 24 large, 37 small

B. 27 large, 34 small

C. 34 large, 27 small

D. 37 large, 24 small

$$x + y = 61$$

$$12x + 9y = 660$$

Example 7

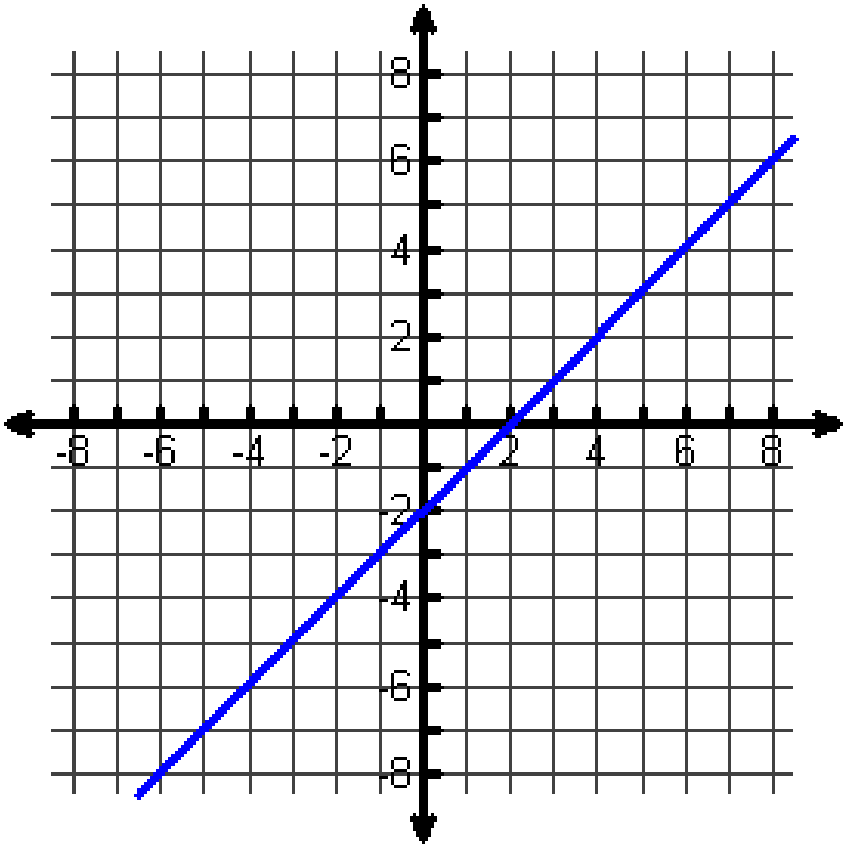
Which equation corresponds to the graph shown?

A. $y = x + 1$

B. $y = 2x + 1$

C. $y = x - 2$

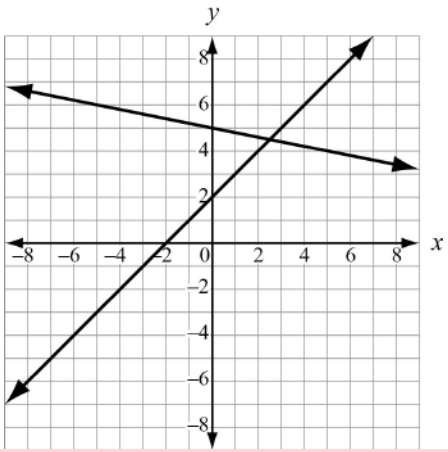
D. $y = -3x - 2$



Example 8

Which graph would represent a system of linear equations that has no common coordinate pairs?

A



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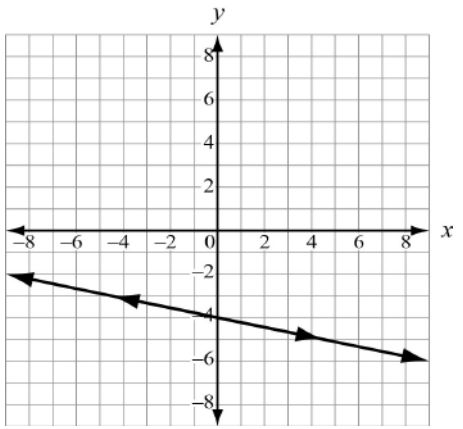

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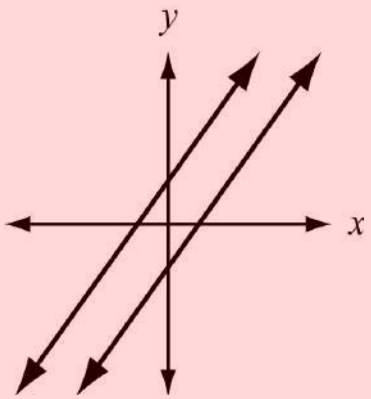

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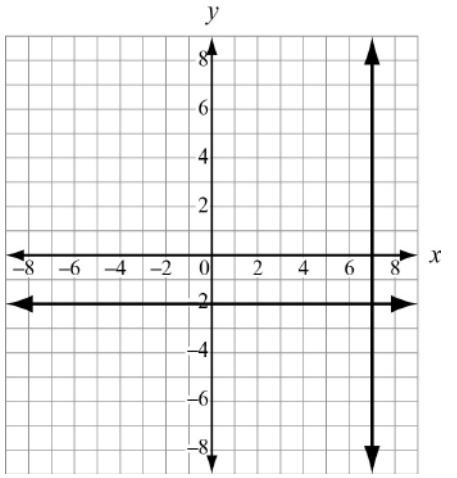

Ex. 9 Graph

$$\begin{cases} y \geq x + 2 \\ x \leq -4 \end{cases}$$