

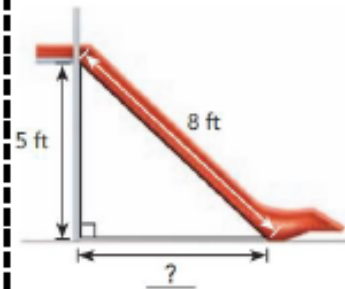
Lesson 5.2 Solving Systems of Linear Equations Using Substitution Method Day 4

Week 1 Friday Course 3 Warm-up

Find the Slope
(20, 8) (9, 16)



Kendrick wants to build a slide for his son in the backyard. He buys a slide that is 8 feet long. The height of the stairs is 5 feet. Find the distance from the bottom of the stairs to the base of the slide.



Simplify the Expression
Write in Exponential Notation

$$\frac{(3^4 \cdot 3^2)^4}{(3^5)^2}$$

Simplify Expression
Write as positive exponent

$$\frac{(b \cdot b^3)^5}{(b^2)^4}$$

Lesson 5.2 Solving Systems of Linear Equations Using Substitution Method Day 4

Week 1 Friday Course 3 Warm-up

Find the Slope

(20, 8) (9, 16)

$$\frac{16-8}{9-20} = \frac{8}{-11}$$

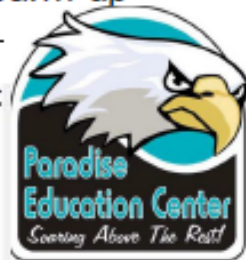
Given two points:

(x_1, y_1) (x_2, y_2)

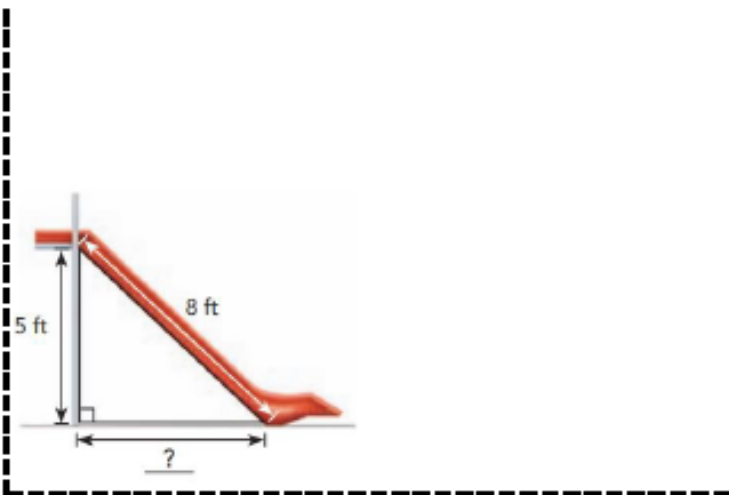
Slope Formula:

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$x_2 - x_1$$



Kendrick wants to build a slide for his son in the backyard. He buys a slide that is 8 feet long. The height of the stairs is 5 feet. Find the distance from the bottom of the stairs to the base of the slide. **6.2 ft**



Simplify the Expression
Write in Exponential Notation

$$\frac{(3^4 \cdot 3^2)^4}{(3^5)^2}$$

$$3^{14}$$

Simplify Expression
Write as positive exponent

$$\frac{(b \cdot b^3)^5}{(b^2)^4}$$

$$b^{12}$$

Lesson 5.2 Solving Systems of Linear Equations Using Elimination Method Day 4

Objective

TSW solve systems of linear equations by finding the unique solution using the following strategy...

*Elimination Method

*Substitution Method

Common Core State Standards

8EE 8a Understand that solutions to a system...satisfy both equations simultaneously. 8EE 8 b Solve Systems of two linear equations in two variables algebraically

Mathematical Practices 2 Reason 3 Construct arguments 4 Model Mathematics



▶ A system of linear equations may have a unique solution. It can be solved using the elimination, substitution, or graphical methods.

Lesson 5.2 Solving Systems of Linear Equations Using Substitution Method Day 4

Quick Write-

What strategies have you learned to solve linear equations? Which strategy do you prefer? Why?

Definition of Substitution Method

Substitution Method

Definition of Substitution Method

Substitution Method

A method of solving a system of equations in which one variable is expressed in terms of the other to eliminate one variable

Lesson 5.2 Solving Systems of Linear Equations Using Substitution Method Day 4

STEP 1 Select one equation. Express one variable in terms of the other.

STEP 2 Substitute this new equation into the second equation to find the value of one variable.

STEP 3 Substitute this value in one of the equations to find the value of the other variable.

$$x + y = 8 \quad \text{— Equation 1}$$

$$x + 2y = 10 \quad \text{— Equation 2}$$

STEP 1 Select one equation. Express one variable in terms of the other.

STEP 2 Substitute this new equation into the second equation to find the value of one variable.

STEP 3 Substitute this value in one of the equations to find the value of the other variable.

Use Equation 1 to express x in terms of y :

$$x + y = 8$$

$$x + y - y = 8 - y \quad \text{Subtract } y \text{ from both sides.}$$

$$x = 8 - y \quad \text{— Equation 3 Simplify.}$$

Substitute Equation 3 into Equation 2 to get an equation with only one variable:

$$(8 - y) + 2y = 10$$

$$8 + y = 10$$

Simplify.

$$8 + y - 8 = 10 - 8 \quad \text{Subtract 8 from both sides.}$$

$$y = 2$$

Simplify.

Substitute 2 for y into Equation 3 to get $x = 8 - 2 = 6$.

So, the solution to the system of equations is $x = 6, y = 2$.

Guided Practice

Solve each system of linear equations using the elimination method.

7 $2x + y = 5$ — Equation 1
 $y = 4x - 7$ — Equation 2

Guided Practice

Solve each system of linear equations using the elimination method.

7 $2x + y = 5$ — Equation 1

$y = 4x - 7$ — Equation 2

Substitute Equation 2 into Equation 1:

$$\underline{\quad} = \underline{\quad} \quad 2x + 4x - 7; 5$$

$$\underline{\quad} = \underline{\quad}$$

Simplify. $6x - 7; 5$

$$\underline{\quad} = \underline{\quad}$$

Add $\underline{\quad}$ to both sides. $6x - 7 + 7; 5 + 7; 7$

$$\underline{\quad} = \underline{\quad}$$

Simplify. $6x; 12$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad} \div \underline{\quad}$$

Divide both sides by $\underline{\quad}$. $6x; 6; 12; 6; 6$

$$x = \underline{\quad}$$

Simplify. 2

Substitute $\underline{\quad}$ for x into Equation 2: 2

$$y = 4(\underline{\quad}) - 7 \quad 2$$

$$= \underline{\quad} - 7 = \underline{\quad} \quad 8; 1$$

The solution to the system of equations is given by $x = \underline{\quad}$ and $y = \underline{\quad}$. $2; 1$

Guided Practice

Solve each system of linear equations using the elimination method.

8 $4x + 3y = 23$ — Equation 1

$5x + y = 15$ — Equation 2

Guided Practice

Solve each system of linear equations using the elimination method.

$$8 \quad 4x + 3y = 23 \quad \text{— Equation 1}$$

$$5x + y = 15 \quad \text{— Equation 2}$$

Use Equation 2 to express y in terms of x :

$$5x + y = 15$$

$$\underline{\quad} = \underline{\quad}$$

Subtract $\underline{\quad}$ from both sides. $5x + y - 5x; 15 - 5x; 5x$

$$\underline{\quad} = \underline{\quad}$$

— Equation 3 Simplify. $y; 15 - 5x$

Substitute Equation 3 into Equation 1:

$$4x + \underline{\quad} = 23 \quad 3(15 - 5x)$$

$$\underline{\quad} = \underline{\quad}$$

Use the distributive property. $4x + 45 - 15x; 23$

$$\underline{\quad} = \underline{\quad}$$

Simplify. $-11x + 45; 23$

$$\underline{\quad} = \underline{\quad}$$

Subtract $\underline{\quad}$ from both sides. $-11x + 45 - 45; 23 - 45; 45$

$$\underline{\quad} = \underline{\quad}$$

Simplify. $-11x; -22$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad} \div \underline{\quad}$$

Divide both sides by $\underline{\quad}$. $-11x; -11; -22; -11; -11$

$$x = \underline{\quad}$$

Simplify. 2

Substitute $\underline{\quad}$ for x into Equation 3: 2

$$y = \underline{\quad} \quad 15 - 5(2)$$

$$= \underline{\quad} \quad 5$$

The solution to the system of equations is given by $x = \underline{\quad}$ and $y = \underline{\quad}$. $2; 5$

Guided Practice

Solve each system of linear equations using the elimination method.

9 $3x - y = 8$
 $2x + 3y = 9$

Guided Practice

Solve each system of linear equations using the elimination method.

9 $3x - y = 8$
 $2x + 3y = 9$

$$x = 3, y = 1$$

Guided Practice

Solve each system of linear equations using the elimination method.

10 $7m + 2n = -8$

$$2m = 3n - 13$$

$$m = -2, n = 3$$

Lesson 5.2 Solving Systems of Linear Equations Using Substitution Method

Practice 5.2 #10,11,18,21,22,25

Challenge-

- *Solve created equations
“Pick a Snowflake”
- *Real World Problem (website)
- *BuzzMath

Practice 5.2

1 $2j + k = 6$
 $j - k = 8$

2 $2j + 3k = 11$
 $2j - 5k = 3$

3 $3m + n = 30$
 $2m - n = 20$

4 $3x - y = 9$
 $2x - y = 7$

5 $5s - t = 12$
 $3s + t = 12$

6 $2b + c = 10$
 $2b - c = 6$

7 $3m - n = 7$
 $21m + 4n = -29$

8 $7a + b = 10$
 $2a + 2b = -8$

9 $2p + 5q = 4$
 $7p + 15q = 9$

Solve each system of linear equations using the substitution method.

10 $2j + k = 3$
 $k = j - 9$

11 $2h + 3k = 13$
 $h = 2k - 4$

12 $3m + b = 23$
 $m - b = 5$

13 $3h - k = 10$
 $h - k = 2$

14 $3s - t = 5$
 $s + 2t = 4$

15 $2x + y = 20$
 $3x + 4y = 40$

16 $3x + 2y = 0$
 $5x - 2y = 32$

17 $5x - y = 20$
 $4x + 3y = 16$

18 $3p + 4q = 3$
 $\frac{1}{2} + q = 3p$

Solve each system of linear equations using the elimination method or substitution method. Explain why you choose each method.

19 $2x + 7y = 32$
 $4x - 5y = -12$

20 $3x + 3y = 22$
 $3x - 2y = 7$

21 $7m + 2n = 20$
 $2m = 3n - 5$

22 $3h - 4k = 35$
 $k = 2h - 20$

23 $2h + 7k = 32$
 $3h - 2k = -2$

24 $2m + 4 = 3n$
 $5m - 3n = -1$

Solve.

25 **Math Journal** Sam solves the following system of linear equations by the elimination method, without using calculator.

$2x + 3y = 1$
$3x - 17y = 23$

He can multiply the first equation by 3 and the second equation by 2 in order to eliminate x . Or he can eliminate y by multiplying the first equation by 17 and the second equation by 3. Which way should Sam choose? Explain.



Lesson Check #22– Can choose the elimination or substitution method to solve systems of linear equations

Ticket Out the Door-

How do you determine the solution to a system of linear equations algebraically? What strategy would you use?