Algebra 1

3.4 Substitution Method

Name:_____

Write your questions and thoughts here!

Notes

Writing Equations

Example 1:

Monica built a porch that contained 2 different colors of bricks to create a nice pattern. She purchased the red bricks at $2 each and the gray bricks for $3 each. How many red bricks did Monica purchase if she spent $160 on 60 bricks?

_____ = # of red bricks

_____ = # of gray bricks

Equation 1: _____

Equation 2: _____

Example 2:

A boat traveled 144 miles downstream and back. The trip downstream took 4 hours. The trip back took 8 hours. What is the speed of the boat in still water?

_____ = speed of the boat

_____ = speed of the river's current

Equation 1: _____

Equation 2: _____

Recall:

Three types of solutions to a system of equations:

1.
2.
3.

Solve by Substitution

1.

2.

3.

ONE SOLUTION

Example 3:

$4x - 3y = -11$
$x + 6y = 4$

Example 4:

$2a + b = -8$
$4a - b = -4$

Example 5:

$7x + 4y = 16$
$7x + y = 4$

Write your questions and thoughts here!

NO SOLUTION	INFINITE SOLUTIONS
Example 6: $6x - 2y = 3$ $-3x + y = 4$	**Example 7:** $3x + 6y = -15$ $x + 2y = -5$

Now summarize what you learned!

3.4 Substitution Method – Solving Systems of Equations

Algebra 1

Practice

Create a system of equations for each problem, but don't solve. Identify each variable's meaning.

1. Maria and Carlos are selling wrapping paper for a school fundraise. Customers can buy rolls of plain wrapping paper and rolls of shiny wrapping paper. Maria sold 9 rolls of plain wrapping paper and 6 rolls of shiny wrapping paper for a total of \$204. Carlos sold 1 roll of plain wrapping paper and 8 rolls of shiny wrapping paper for a total of \$140.

_____ = _____
(variable) (what the variable represents)

_____ = _____
(variable) (what the variable represents)

Equation 1: _____

Equation 2: _____

2. A plane traveled 900 miles to Cleveland and back. (900 miles each way for a total of 1800 miles.) The trip there was with the wind and it took 9 hours. The trip back was into the wind and took 18 hours.

_____ = _____
(variable) (what the variable represents)

_____ = _____
(variable) (what the variable represents)

Equation 1: _____

Equation 2: _____

3. The Spanish Club purchased 34 tacos for \$40 to sell for a fundraiser. They purchased chicken tacos for \$1 each and beef tacos for \$1.50 each.

_____ = _____
(variable) (what the variable represents)

_____ = _____
(variable) (what the variable represents)

Equation 1: _____

Equation 2: _____

4. A total of \$1150 was invested, part of it at 12% and part at 11%. The total interest earned was \$133.75.

_____ = _____
(variable) (what the variable represents)

_____ = _____
(variable) (what the variable represents)

Equation 1: _____

Equation 2: _____

Solve each system of equations using substitution.

5. $2x + 8y = -16$
$y = x - 12$

6. $a = 4b + 19$
$-b + 4a = 16$

7. $3x - y = 2$
$6x + 3y = 14$

8. $4l + w = -2$
$4l + 4w = -8$

9. $c - 3d = 1$
$-3c + 9d = 0$

10. $4m + 4n = -12$
$m + 2n = -2$

11. $3x + 6y = -15$
$x + 2y = -5$

12. $2h - a = 1$
$8h + 4a = 6$

13. $C - 4r = -3$
$2C - 8r = -6$

14. $\begin{aligned} -w + 3z &= -4 \\ w + 3z &= -8 \end{aligned}$

15. $\begin{aligned} 4x - 3y &= 0 \\ 4x + y &= 0 \end{aligned}$

16. $\begin{aligned} a - 4b &= 3 \\ 4a - 3b &= -1 \end{aligned}$

17. $\begin{aligned} -2\alpha + 2\beta &= -4 \\ 2\alpha + \beta &= 1 \end{aligned}$

These are Greek letters Alpha and Beta.

18. $\begin{aligned} y - 2x &= 4 \\ 4x - 2y &= 0 \end{aligned}$

3.4 Substitution Method – Solving Systems of Equations

Wrap up

Practice check: The next two questions are just like the practice, but we provide no answers. If you can't do these problems, then you're definitely not ready for a Mastery Check!

19. The perimeter of a rectangular parking lot is 190 meters. The width is one-fourth the length. Write a system of equations for this scenario.

20. Solve $\begin{aligned} x - 4y &= -4 \\ -3x + 12y &= -4 \end{aligned}$

21. Remember Mr. Bean riding his motor scooter and lawn mower? Assume Hill-Billie Bean is on his lawnmower at his house. 1 kilometer away is Biker Bean riding his motor scooter towards Hill-Billie Bean to play chicken. Assume the lawnmower is traveling at 5 km/hour, and the scooter is traveling at 15 km/h.

    a. Identify the two variables to be used and what they represent.

    b. Create an equation that represents the distance traveled by Hill-Billie Bean (assume the starting point is his house).

    c. Create an equation that represents the distance traveled by Biker Bean. *Hint: the motor scooter is getting closer to the house, so this affects the rate of change.*

    d. How much time will pass until they run into each other?

    e. How far will the lawnmower travel?

Exit Ticket

In Lewis Carroll's *Through the Looking Glass,* Tweedledum says, "The sum of your weight and twice mine is 361 pounds." Tweedledee replies, "The sum of your weight and twice mine is 362 pounds." Find both of their weights.