Name ______________________________________ Class ____________ Date ____________

3-1 Reteaching

Solving Systems Using Tables and Graphs

As you solve a system of equations, remember the following ideas.

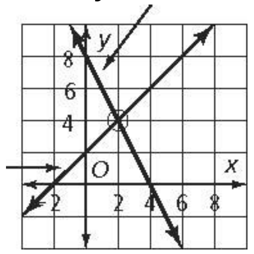
- Lines that have the same slopes but different *y*-intercepts are parallel and will never intersect. These systems are *inconsistent*.
- Lines that have both the same slope and the same *y*-intercept are the same line and will intersect at every point. These systems are *dependent*.
- Lines that have different slopes will intersect, and the system will have one solution. These systems are *independent*.

Problem

Using a graph or a table, what is the solution of the system of equations? $\begin{cases} 2x + y = 8 \\ y - x = 2 \end{cases}$

$y = -2x + 8$ Write both equations in $y = mx + b$ form.

$y = x + 2$



Graph the line $y = -2x + 8$. Graph the line $y = x + 2$. Circle the point of intersection.

$x = 2, y = 4$ Determine the *x*- and *y*-coordinates of the point of intersection.

The solution is the ordered pair (2, 4).

Check Check by substituting the solution into both equations.

$$2(2) + 4 \stackrel{?}{=} 8$$
$$4 + 4 \stackrel{?}{=} 8$$
$$8 = 8 \checkmark$$
$$4 - 2 \stackrel{?}{=} 2$$
$$2 = 2 \checkmark$$

Exercises

Solve each system by graphing or using a table. Check your answers.

1. $\begin{cases} 3x + y = 6 \\ y = 3 \end{cases}$

2. $\begin{cases} -2x + y + 3 = 0 \\ x - 1 = y \end{cases}$

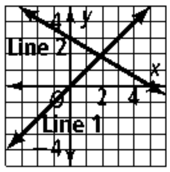
3. $\begin{cases} x + y = 3 \\ y = 3x - 1 \end{cases}$

4. $\begin{cases} y = 1 - x \\ 2x + y = 4 \end{cases}$

5. $\begin{cases} -x + 2y = 2 \\ 3x + 2y = -6 \end{cases}$

6. $\begin{cases} -x + y = -2 \\ -2x + 3y = -3 \end{cases}$

7. Which point lies on both Line 1 and Line 2?



(A) (0, 0)

(B) (2.05, 2.05)

(C) (1.875, 1.875)

(D) (2, 2)

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3-1 Reteaching (continued)

Solving Systems Using Tables and Graphs

Problem

The table shows the winning times for the Olympic 400-M dash. Use your graphing calculator to find linear models for women's and men's winning times. Assuming the trends in the table continue, when will the women's winning time and the men's winning time be equal? What will that winning time be?

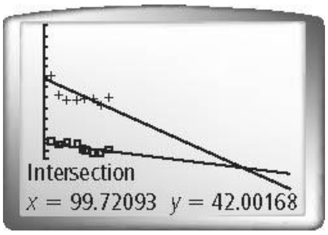
Winning Times for the Olympic 400-M Dash (seconds)

Year	1968	1972	1976	1980	1984	1988	1992	1996	2000
Men's Times	43.86	44.66	44.26	44.60	44.27	43.87	43.50	43.49	43.84
Women's Times	52.03	51.08	49.29	48.88	48.83	48.65	48.83	48.25	49.11

SOURCE: International Olympic Committee

Step 1 Enter the data into lists on your calculator.
L1: number of years since 1968 (value for x)
L2: men's winning times in seconds (value for y_1)
L3: women's winning times in seconds (value for y_2)

Step 2 Use LinReg($ax + b$) to find linear models. This determines the equation of the lines of best f t for the selected data.
Use L1 and L2 for the men's winning times.
Use L1 and L3 for the women's winning times.



Step 3 Graph each model. Use the Intersect feature on the graphing calculator to find the solution of the system. The solution is $x = 99.72093$ and $y = 42.00168$.

The linear model shows that if the table's trends continue, the times for men and women will be equal about 100 years after 1968, in 2068. The winning time will be about 42 seconds.

Exercise

8. The table shows the winning times for Olympic 500-M speed skating. Assuming these trends continue, when will the women's winning time equal the men's winning time? What will that winning time be?

Winning Times for the Olympic 500-M Speed Skating (seconds)

Year	1968	1972	1976	1980	1984	1988	1992	1994	1998
Men's Times	40.30	39.44	39.17	38.03	38.19	36.45	37.14	36.33	35.59
Women's Times	46.10	43.33	42.76	41.78	41.02	39.10	40.33	39.25	38.21

SOURCE: International Olympic Committee

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3-2 Reteaching

Solving Systems Algebraically

Follow these steps when solving by substitution.

Step 1 Solve one equation for one of the variables.

Step 2 Substitute the expression for this first variable into the other equation. Solve for the second variable.

Step 3 Substitute the second variable's value into either equation. Solve for the first variable.

Step 4 Check the solution in the other original equation.

Problem

What is the solution of the system of equations? $\begin{cases} 4x + 3y = 10 \\ x + 2y = 10 \end{cases}$

Step 1 $x = -2y + 10$ — Solve one equation for *x*.

Step 2

$4(-2y + 10) + 3y = 10$ — Substitute the expression for *x* into the other equation.

$-8y + 40 + 3y = 10$ — Distribute.

$-5y = -30$ — Combine like terms.

$y = 6$ — Solve for *y*.

Step 3

$x + 2(6) = 10$ — Substitute the *y* value into either equation.

$x + 12 = 10$ — Simplify.

$x = -2$ — Solve for *x*.

Step 4

$4(-2) + 3(6)\ 0 \stackrel{?}{=} 10$ — Check the solution in the other equation.

$-8 + 18 \stackrel{?}{=} 10$ — Simplify.

$10 = 10$ ✓

The solution is (–2, 6).

Exercises

Solve each system by substitution.

1. $\begin{cases} x - 3y = 2 \\ -x + 2y = 5 \end{cases}$

2. $\begin{cases} a - 3b = 4 \\ a = -2 \end{cases}$

3. $\begin{cases} -2m + n = 6 \\ -7m + 6n = 1 \end{cases}$

4. $\begin{cases} 7x - 3y = -1 \\ x + 2y = 12 \end{cases}$

3-2 Reteaching (continued)

Solving Systems Algebraically

Follow these steps when solving by elimination.

Step 1 Arrange the equations with like terms in columns. Circle the like terms for which you want to obtain coefficients that are opposites.

Step 2 Multiply each term of one or both equations by an appropriate number.

Step 3 Add the equations.

Step 4 Solve for the remaining variable.

Step 5 Substitute the value obtained in step 4 into either of the original equations, and solve for the other variable.

Step 6 Check the solution in the other original equation.

Problem

What is the solution of the system of equations? $\begin{cases} 2x - 5y = 11 \\ 3x - 2y = -12 \end{cases}$

Step 1	$2x + 5y = 11$ $3x - 2y = -12$	Circle the terms that you want to make opposite.
Step 2	$6x + 15y = 33$ $-6x + 4y = 24$	Multiply each term of the first equation by 3. Multiply each term of the second equation by –2.
Step 3	$19y = 57$	Add the equations.
Step 4	$y = 3$	Solve for the remaining variable.
Step 5	$3x - 2(3) = -12$ $x = -2$	Substitute 3 for y to solve for *x*.
Step 6	$2(-2) + 5(3) \stackrel{?}{=} 11$ $-4 + 15 \stackrel{?}{=} 11$ $11 = 11$ ✓	Check using the other equation.

The solution is (–2, 3). You can also check the solution by using a graphing calculator.

Exercises

Solve each system by elimination.

5. $\begin{cases} 3x + 2y = -17 \\ x - 3y = 9 \end{cases}$

6. $\begin{cases} 5f + 4m = 6 \\ -2f - 3m = -1 \end{cases}$

7. $\begin{cases} 3x - 2y = 5 \\ -6x + 4y = 7 \end{cases}$

8. $\begin{cases} -2x - 4y = 2 \\ 10x + 20y = -10 \end{cases}$

9. Reasoning Why does a system with no solution represent parallel lines?