Name _____ Class _____ Date _____

# 3-3 Reteaching

Systems of Inequalities

## Solving a System by Using a Table

**Problem**

An English class has 4 computers for at most 18 students. Students can either use the computers in groups to research Shakespeare or to watch an online performance of Macbeth. Each research group must have 4 students and each performance group must have 5 students. In how many ways can you set up the computer groups?

**Step 1** Relate the unknowns and define them with variables.

$x$ = number of research groups, $y$ = number of performance groups

number of research groups + number of performance groups $\leq 4$

$4 \cdot$ number of research groups $+ 5 \cdot$ number of performance groups $\leq 18$

$x + y \leq 4$

$4x + 5y \leq 18$

| x | y |
|---|---|
| 0 | 4, 3, 2, 1, 0 |
| 1 | 3, 2, 1, 0 |
| 2 | 2, 1, 0 |
| 3 | 1, 0 |
| 4 | 0 |

**Step 2** Make a table of values for $x$ and $y$ that satisfy the first inequality. The replacement values for $x$ and $y$ must be whole numbers.

**Step 3** In the table, check each pair of values to see which satisfy the other inequality. Highlight these pairs. These are the solutions of the system.

| x | y |
|---|---|
| 0 | 4, 3, 2, 1, 0 |
| 1 | 3, 2, 1, 0 |
| 2 | 2, 1, 0 |
| 3 | 1, 0 |
| 4 | 0 |

You can have:
0 groups doing research and 0, 1, 2, or 3 groups watching performances or
1 group doing research and 0, 1, or 2 groups watching performances or
2 groups doing research and 0, 1, or 2 groups watching performances or
3 groups doing research and 0 or 1 group watching performances or
4 groups doing research and 0 groups watching performances

## Exercises

**Find the whole number solutions of each system using tables.**

1. $\begin{cases} x + y < 4 \\ x + 2y \leq 10 \end{cases}$
(0, 0), (0, 1), (0, 2), (0, 3), (1, 0), (1, 1), (1, 2), (2, 0), (2, 1), (3, 0)

2. $\begin{cases} x - y \geq 1 \\ 6x + 3y \leq 21 \end{cases}$
(1, 0), (2, 0), (2, 1), (3, 0), (3, 1)

3. $\begin{cases} x + y \geq 5 \\ y < -2x + 8 \end{cases}$
(0, 5), (0, 6), (0, 7), (1, 4), (1, 5), (2, 3)

4. $\begin{cases} y < 3 \\ 4x + 2y < 12 \end{cases}$
(0, 0), (0, 1), (0, 2), (1, 0), (1, 1), (1, 2), (2, 0), (2, 1)

Name _____ Class _____ Date _____

# 3-3 Reteaching (continued)

Systems of Inequalities

## Solving a System by Graphing

**Problem**

What is the solution of the system of inequalities? $\begin{cases} 2x - y > 1 \\ x + y \geq 3 \end{cases}$

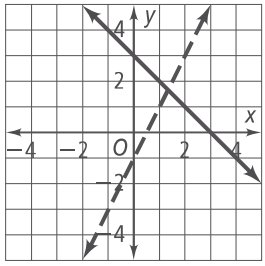
**Step 1** Solve each inequality for $y$.

$2x - y > 1$ and $x + y \geq 3$

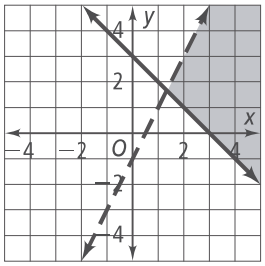
$-y > -2x + 1$ and $y \geq -x + 3$

$y < 2x - 1$

**Step 2** Graph the boundary lines. Use a solid line for $\geq$ or $\leq$ inequalities. Use a dotted line for $>$ and $<$ inequalities.

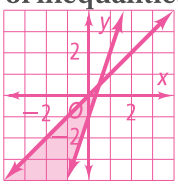


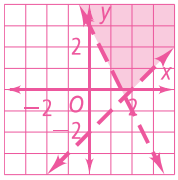
**Step 3** Shade on the appropriate side of each boundary line. The overlap is the solution to the system.

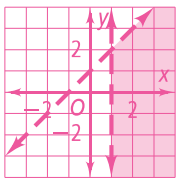


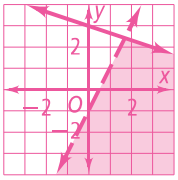
## Exercises

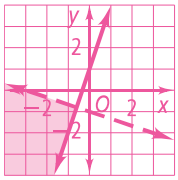
**Solve each system of inequalities by graphing.**

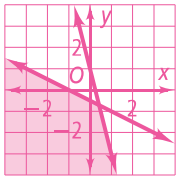
5. $\begin{cases} y \leq x \\ y \geq 3x - 1 \end{cases}$ 

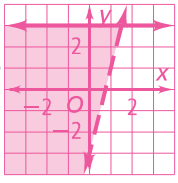
6. $\begin{cases} 2x + y > 3 \\ x - y < 2 \end{cases}$ 

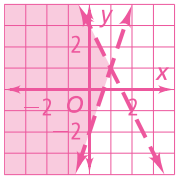
7. $\begin{cases} x > 1 \\ y < x + 1 \end{cases}$ 

8. $\begin{cases} x + 3y \leq 9 \\ 2x - y > 1 \end{cases}$ 

9. $\begin{cases} y < -\frac{1}{3}x - 1 \\ y \geq 3x + 1 \end{cases}$ 

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

11. $\begin{cases} y \leq 3 \\ y > 4x - 3 \end{cases}$ 

12. $\begin{cases} 2x + y < 3 \\ 3x - y < 2 \end{cases}$ 

13. $\begin{cases} y \geq -2 \\ 3x + y \leq 2 \end{cases}$