

## 7<sup>th</sup> Grade Advanced Math: Block 4 Review: Systems of Equations

You can create one-page (front and back) of notes to use on the Block 4 Test.

Below is a list of important concepts covered in this block.

All these concepts can be found in your guided notes.

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### Same Line, Parallel Lines and Intersecting Lines

- The solution to the system of linear equations is found at the point of intersection of the two lines.
  - Systems of linear equations can have one solution, no solutions or infinitely many solutions.
  - You must be able to determine the type of system (same line, parallel lines and intersecting lines) when given to linear equations.
  - Remember to convert all equations into slope-intercept form to determine the solution. Once the equations are in slope-intercept form, you can determine the solution by looking at the equations.
  - You must be able to graph the system, determine the type of system, and state how many solutions there will be for the solution on the test.
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### Solving Systems of Equations by Substitution

<b>Solve:</b>	$y = x + 1$ $2x + y = 13$
Step 1: Pick one equation and solve it for one variable (x or y).	<b>In this example, the y variable is already isolated.</b>
Step 2: substitute that expression into the other equation.	<b>Substitute into the second equation.</b> $2x + (x + 1) = 13$
Step 3: Solve the equation to find the first variable.	<b>Solve for x:</b> $3x + 1 = 13$ $3x = 12$ $x = 4$
Step 4: Plug back in to find the second variable.	<b>Plug back in:</b> $y = x + 1$ $y = 4 + 1$ $y = 5$
Step 5: Write the solution as an ordered pair, (x, y).	<b>Write the solution:</b> (4, 5)
Step 6: Check your work by substituting the solution (x, y) back into one of the original equations.	$2x + y = 13$ $2(4) + 5 = 13$ $8 + 5 = 13$ $13 = 13$



**Example 2:** Ava designs custom water bottles and sells them at local events. She sells two types:

- **Standard bottle — \$18**
- **Glow-in-the-dark bottle — \$28** (which is **\$10 more** than the standard)

At her last event, Ava sold 15 bottles total and made \$370 in sales. How many of each type did she sell? Let  $s$  be the number of standard water bottles and  $g$  be the number of glow-in-the-dark water bottles.

$$\text{Total Water Bottles:} \quad s + g = 15$$

$$\text{Total Money:} \quad 18s + 28g = 370$$

Since both the variables ( $s$  and  $g$ ) in the first equation do not have a coefficient in front of the variable, it is easiest to isolate one of these variables and then use substitution to solve This word problem.

**Answer: Ava sold 5 standard water bottles and 10 glow-in-the-dark water bottles.**

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## Systems of Linear Inequalities

Step 1: Graph each boundary line

- Change the inequality to an equals sign to graph the line.
- Use solid line if the inequality is  $\leq$  or  $\geq$
- Use dashed line if the inequality is  $<$  or  $>$

Step 2: Shade the correct side of each line

- Pick a test point (like  $(0,0)$  unless it's on the line).
- Plug it into the inequality.
- If the statement is true, shade where the point is.
- If false, shade the opposite side.

Step 3: Find the overlapping shaded region

- The solution to the system is where all shaded areas overlap.
- This region shows all points that make both inequalities true.