Standards for showing work and writing conclusions to math problems in MTH 60

Notation is an important part of how we communicate the results to a mathematical problem. Here is a quick reference for how to write your answers for this course:

Problem Type	Special Notes	How to write your answer	Possible Example (Check with your instructor for how they prefer you to show your work.)
Evaluating an Expression.	Evaluating means you have an expression (there is no equal sign in the statement of what you are asked to do). You will often times see the word "evaluate," "state," or "find."	Show your substitution step and then work out the arithmetic using equal signs before each line to show equivalency of the expressions.	Evaluate $2x^2 + 5x - 3$ for $x = -2$. If $x = -2$ then $2x^2 + 5x - 3 = 2(-2)^2 + 5(-2) - 3$ $= 2(4) - 10 - 3$ $= 8 - 10 - 3$ $= -5$
Checking to see if a number is a solution to an equation in one variable.	A solution to an equation or inequality is a number which, when plugged into the equation or inequality for the variable, allows for a true statement.	Show your substitution into the equation, working both sides simultaneously, and then state whether the number being tested is or is not a solution.	Check $2x + 5 = 3x - 4$ for $x = 9$. $2(9) + 5 \stackrel{?}{=} 3(9) - 4$ $18 + 5 \stackrel{?}{=} 27 - 4$ $23 = 23$ Is a true statement. So 9 is a solution to the equation. Check $2x - 4 \leq 5x + 1$ for $x = -3$. $2(-3) - 4 \stackrel{?}{\leq} 5(-3) + 1$ $-6 - 4 \stackrel{?}{\leq} -15 + 1$ $-10 \leq -14$ Is a false statement. So -3 is not a solution to the inequality.

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Solving an equation.	You be given an equal sign between two algebraic expressions. You will often times see the word "solve" in the directions.	Show your work with your equal signs lined up in the middle of each equation. Do not put equal signs on the left. State what the solution is in a sentence and use either set builder or interval notation as asked for in the directions.	Solve $2x + 6 = 5x$ for x. $2x + 6 = 5x$ $2x + 6 - 2x = 5x - 2x$ $6 = 3x$ $\frac{6}{3} = \frac{3x}{3}$ $2 = x$ So the solution is 2 and the solution set is $\{2\}$. OR So the solution is 2 and the solution set is $\{x \mid x = 2\}$.
		If there are an infinite number of solutions, communicate this using the "set of all real numbers" symbol.	Solve $3(x - 5) + 1 = 2x - 14 + x$ for x. $3(x - 5) + 1 = 2x - 14 + x$ $3x - 15 + 1 = 3x - 14$ $3x - 14 = 3x - 14$ $3x - 14 - 3x = 3x - 14 - 3x$ $-14 = -14$ Is a true statement. So every real number is a solution and the solution set is $\mathbb{R}$. OR So every real number is a solution and the solution set is $\{x \mid x \in \mathbb{R}\}$.
		If there is no solution, communicate this using either of the empty set symbols.	Solve $x + 2 = x + 1$ for x. $x + 2 = x + 1$ $x + 2 - x = x + 1 - x$ $2 = 1$ Is not a true statement. So there is no solution and the solution set is $\{\}$. OR So there is no solution and the solution set is $\emptyset$.

Problem Type	Special Notes	How to write your answer	Possible Example (Check with your instructor for how they prefer you to show your work.)
Solving an inequality.	You be given an inequality symbol $(<, >, \leq, \text{or } \geq)$ between two algebraic expressions. You will often times see the word "solve" in the directions.	Show your work with your inequality signs lined up in the middle of each inequality. Do not put equal signs on the left. State what the solution is in a sentence and use either set builder or interval notation as asked for in the directions.	Solve $2 - w \leq 4$ for w. $2 - w \leq 4$ $2 - w - 2 \leq 4 - 2$ $-w \leq 2$ $\frac{-w}{-1} \geq \frac{2}{-1}$ $w \geq -2$ So every number greater than or equal to -2 is a solution and the solution set is $\{w \mid w \geq -2\}$. OR So every number greater than or equal to -2 is a solution and the solution set is $[-2, \infty)$.
		If there are an infinite number of solutions, communicate this using the "set of all real numbers" symbol.	Solve $w + 2 \leq w + 4$ for w. $w + 2 \leq w + 4$ $w + 2 - w \leq w + 4 - w$ $2 \leq 4$ Is a true statement. So every real number is a solution and the solution set is $\mathbb{R}$. OR So every real number is a solution and the solution set is $(-\infty, \infty)$.
		If there is no solution, communicate this using either of the empty set symbols.	Solve $w + 4 \leq w + 2$ for w. $w + 4 \leq w + 2$ $w + 4 - w \leq w + 2 - w$ $4 \leq 2$ Is not a true statement. So there are no solutions and the solution set is $\{\}$. OR So there are no solutions and the solution set is $\emptyset$.

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Determining the horizontal and vertical (often x and y) intercepts.	Your book may only provide the x or y values. Please follow the directions found on this sheet instead of matching the answers in your book. You will often times see the instructions "find the intercepts."	State the full ordered pairs for all intercepts using a complete sentence.	Find the intercepts of $2x - 3y = 6$. $2x - 3(0) = 6$ $\quad$ $2(0) - 3y = 6$ $2x = 6$ $\quad$ $-3y = 6$ $\frac{2x}{2} = \frac{6}{2}$ $\quad$ $\frac{-3y}{-3} = \frac{6}{-3}$ $x = 3$ $\quad$ $y = -2$ The x-intercept is $(3, 0)$ and the y-intercept is $(0, -2)$.
Checking to see if a point is a solution to an equation or inequality in two variables.	A solution to an equation or inequality in two variables is a number which, when plugged into the equation or inequality for the variables, allows for a true statement. You will often times see the word "check."	Show your substitution into the equation or inequality, working both sides simultaneously, and then state whether the number being tested is or is not a solution.	Check if the point $(-1, 2)$ is a solution to the equation $2x - 3y = 6$. $2(-1) - 3(2) \stackrel{?}{=} 6$ $-2 - 6 \stackrel{?}{=} 6$ $-8 = 6$ $\quad$ Is a false statement. So the ordered pair $(-1, 2)$ is not a solution to the equation. --- Check if the point $(2, 1)$ is a solution to the inequality $2x - 3y < 6$. $2(2) - 3(1) \stackrel{?}{<} 6$ $4 - 3 \stackrel{?}{<} 6$ $1 < 6$ $\quad$ Is a true statement. So the ordered pair $(2, 1)$ is a solution to the inequality.

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Solving word problems.	These problems will generally describe a situation and a relationship between two variables with units defined for each variable.	Write your answer as a complete sentence, giving a contextual conclusion which answers the question being asked.	If a rock falls from a height of 20 meters on Earth, the height H, in meters, x seconds after it began to fall is approximately $H = 20 - 4.9x^2$. What is the height of the rock 1 second after beginning its fall? $H = 20 - 4.9(1)^2$ $H = 20 - 4.9$ $H = 15.1$ The height of the rock 1 second after beginning its fall is approximately 15.1 meters.
Rectangular Coordinate System Guidelines.	Remember, the graph is a picture of the solutions to the equation. The horizontal-axis (often the x-axis) and vertical-axis (often the y axis) are the *coordinate system* or *coordinate plane* which we draw the graph onto.	Label your *horizontal* and *vertical* axes (often x and y) with an appropriate scale, label the line with its equation and any points required by your instructor (often the vertical intercept and sometimes others).	Graph the equation $y = 2x - 3$. The slope is $m = \frac{2}{1}$ and the y-intercept is $(0, -3)$.