BRIEF INFORMATION FOR PHGA

Keep this sheet handy when you are entering your answers in PHGA

PHGA Question Types and Syntax

PHGA has a number of different question types. While some questions are multiple choice, most are "free response" with an answer box for you to type in your answer. You can use a symbol palette by clicking "Change Math Entry Mode" underneath most problems. Or, you can use standard graphing calculator syntax to type in your answer. For example, the computer will understand formulas like:

x^2-2x+1 **2sin(x)** **(x^2+1)e^(-x^2)**

The following hints and suggestions will help you avoid common pitfalls, and will make your use of PHGA go more smoothly.

Tips for Smooth Answer Entry

1. **Read the directions to the problem carefully.** Often, the directions contain the instructions on what type of answer is required, i.e. "enter a formula for the following…".

2. **Look under the entry box for the description of the expected format of the answer**. For example, it will state: "This question accepts numbers or formulas".

3. **Click "Help**" under the entry box if you are unsure of the correct syntax.

4. **When available, use the Preview feature**. The PREVIEW button will show you your answer in a standard, familiar notation. This will help you put balanced parentheses in the correct places and avoid other pitfalls. When you enter the first question of an assignment, click the Preview button under the answer field. This will download the preview software. After you key in an answer (unless it is a simple number) preview it (click on preview) and it will display it in standard, familiar notation. Between questions, minimize (but do not close) the previewer so you can use it on the next question without downloading it a second time.

5. **Enter exact answers** unless the question specifies otherwise. Do not approximate values unless the questions states to do so. If the answer is **sqrt(2)**, then **1.41421** is not a correct answer, even if you type in 10 decimals.

6. **A common error in PHGA is to not put in enough parentheses in your answer.** It never hurts to put in too many parentheses. It may hurt you if you don't put in enough or if you do not balance them properly. PHGA evaluates your answer in order of precedence; operators of equal precedence get evaluated left to right. The order is (from highest to lowest):

    - parentheses
    - functions (like sin() or sqrt())
    - powers (^)
    - multiplication and division
    - addition and subtraction

    For example:

    - **sqrt 2*x**: The sqrt function has a higher precedence than multiplication; EDU sees this as **(sqrt 2)*x**, not as **sqrt(2*x)**.
    - **2^3*4**: the power has a higher precedence than multiplication; EDU sees this as **(2^3)*4** or **32**, not as **2^12,** or **4096**.

- **1/2/3/4**: the divisions have equal precedence, so they get evaluated left to right: 1 divided by 2, then divided by 3, then divided by 4, or **1/24**. If you want (1/2) divided by (3/4), put in parentheses.

7. **Another common error in PHGA is to not group the numerator and denominator when writing a rational expression**. So, if you want the quantity $x+3$ to be divided by the quantity $3+x^2$, you MUST write it as **(x+3)/(3+x^2)**. If you write **x+3/3+x^2** this means $x+(3/3)+x^2$ which is equal to $x+1+x^2$.

8. **The order of your answers may or may not be important**. Read the problem carefully. If more than one answer is required and you are <u>not</u> asked to enter them in a particular order, then separate them by <u>semi-colons</u> (the problem will mention this at the bottom). <u>If order is important</u>, then separate them by <u>commas</u>. Examples:

   order not important - "List all the solutions to ... "
   order is important - "List the slope and then the y-intercept of the line ..."

9. If you want $2x$, you can write it just as **2x**, you do not need to write **2*x** (although **2*x** will work).

10. **Questions requiring an equation for an answer will state so in the directions**. Unless it stipulates that "this question accepts equations" below the answer field, <u>it will be incorrect</u> to enter the equal sign in that answer field. However, if this instruction is displayed below the field, then that response <u>needs to have</u> an equal sign in it.

11. **Variable Names:** You can use any letter for a variable name, but you must always use the same letter that is used in the question. If the question asks you to for you to expand $(t+1)^2$ then the answer **x^2+2x+1** will be graded wrong. The question should always specify the appropriate variable to use.

12. **Warning:** The system is also **case sensitive**. So if the question asks for you to expand the term $(t+1)^2$, then the answer **T^2+2T+1** will be graded wrong (but **t^2+2t+1** will be OK). Take care with letters like x and X or v and V that your variables are the same case as the variable in the question.

13. Function notation like $f(x)$ is interpreted as simple multiplication by the system, or as the term xf. A question asking you to "express f as a function of x" will generally only be asking for the right side of that equation. Often, a blank will be provided after "$f(x)=$" so as to avoid confusion.

14. It will never be appropriate to enter any of the following symbols in an answer field (other than in the body of an essay response): **$**, **%**, **#**, **‘**, **“**.
    Adding these symbols will cause the system to grade your response as incorrect.

15. **Special Instructions** If a question has additional instructions, they will appear along with the question. Read each question thoroughly to ensure that you are indeed answering the question that is being asked. Some questions provide special words that are applicable only to that problem, and that should only be entered if certain conditions exist (i.e., **INF**, **none**, or **undef)**. These special words should be entered exactly as they appear in the instructions.

Here is a list of accepted symbols and functions that PHGA will accept, unless otherwise specified otherwise:

(*ALWAYS USE LOWER CASE* unless the problem uses upper case)

Operations and Functions		
Division	**/**	Make sure you group your numerator and denominator if it is more than one variable or one number.
Multiplication	*****	
Addition	**+**	
Subtraction	**-**	
Square root	**sqrt( )** or **( )^(1/2)**	If you use the exponent notation, make sure you put the ½ in parenthesis
Cube root	**( )^(1/3)**	Make sure you put the base, if more than one number or variable, and the exponent in parenthesis. The system does not accept cube roots of negative numbers so factor out the negative sign. For example, write (- 71)^(1/3) as - (71)^(1/3)
Absolute value	**abs( )**	
Grouping symbols	**( )**	If you need nested grouping symbols, still use parenthesis. DO NOT USE { }, or [ ]
Natural logarithm	**ln( )**	
Common logarithm	**log( )**	
Log base b	**(ln( ))/(ln(b))**	
Plus or minus		There is no way to write plus or minus. If you are solving an equation whose solution is +/- 4, you must write each answer separately separated by semi-colons. That is, write 4;-4
Variables	specified by the problem	If the problem asks for an equation or expression, then use x and y unless the problem gives the variable a letter. For example, if the problem says to find distance, s, as a function of time, t, then use s and t. If the problem states to find cost, C, then use a capital C.
Exponentiation	**^**	
Trig Functions		
Sine	**sin**	
Cosine	**cos**	
Tangent	**tan**	
Inverse Sin	**arcsin**	
Inverse Cosine	**arccos**	
Inverse Tangent	**arctan**	
Secant	**sec**	
Cosecant	**csc**	
Cotangent	**cot**	
Numbers		
E	**e**	e ~ 2.71828

π	**pi**	π ~ 3.14159
Scientific Notation: 290,000,000	Example 2.9E8	2.9E8 = 290,000,000