

Name: _____

Date: _____

EXPLORING FUNCTIONS USING THE GRAPHING CALCULATOR

Graphing calculators are powerful tools in our exploration of functions and the rules that define them. Because calculators are so good at doing calculations, it is fairly easy to have them evaluate expressions that are the rules for generating the outputs for the functions. Throughout this entire lesson, we will assume that you have a calculator that can do the following:

- USE THE Y= BUTTON ✓
- USE THE TABLE BUTTON ✓
- USE THE GRAPH BUTTON ✓

We can use our calculator to help us produce tables that are very useful in plotting graphs and exploring functions.

Exercise #1: Consider the linear function $f(x) = \frac{1}{2}x + 2$. Do the following by using your graphing calculator's table function.

(a) Evaluate $f(-6)$, $f(0)$ and $f(8)$.

-6	-1	2	6
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(b) Explore the table to determine the value of x for which $f(x) = 11$.

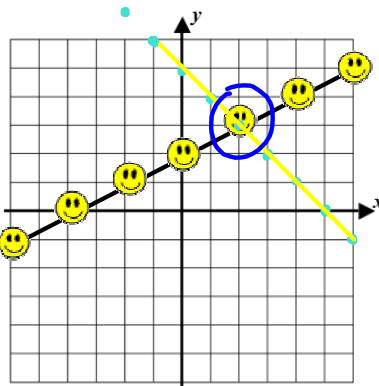
$x = 18$ ↑ output (y)

(c) Use the table to fill out the following table and graph the function on the grid for the interval $-6 \leq x \leq 6$.

x	y	(x, y)
-6	-1	(-6, -1)
-4	0	(-4, 0)
-2	1	(-2, 1)
0	2	(0, 2)
2	3	(2, 3)
4	4	(4, 4)
6	5	(6, 5)

$g(x)$

x	y
-3	8
-2	7
-1	6
0	5
1	4
2	3



(d) Graph the linear function $g(x) = 5 - x$ on the same set of axes and find where the two lines intersect.

(2, 3)

(e) Show that the point that you found in (d) is a solution to both equations:

$$y = \frac{1}{2}x + 2 \text{ and } y = 5 - x$$

NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR Δ Tb1

X	Y1
-6	-1
-5	-1/2
-4	0
-3	1/2
-2	1
-1	3/2
0	2

X=-6

NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR Δ Tb1

X	Y1	Y2
-3	8	
-2	7	
-1	6	
0	5	
1	4	
2	3	

NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR Δ Tb1

X	Y1
2	3
3	7/2
4	4
5	3/2
6	2
7	11/2
8	6

X=8

HW

The calculator can do the heavy lifting with the calculations, while we examine the results. Always be careful when entering algebraic expressions on your calculator. Let's take a look at a **quadratic function** using the graphing calculator.

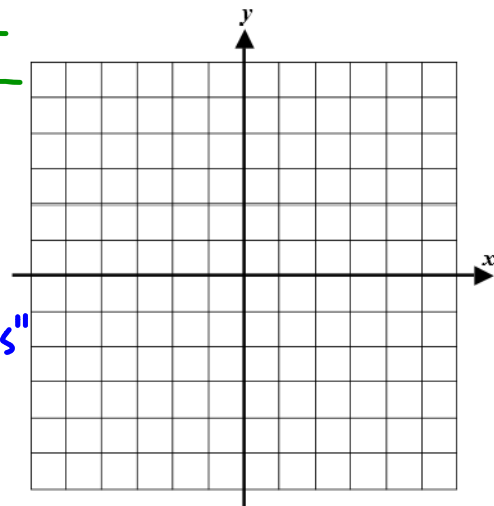
Exercise #2: Consider the function $y = (x-1)^2 - 4$ over the interval $-1 \leq x \leq 4$. Do the following with the use of tables on your graphing calculator.

(a) Create a table of values for this function over the specified interval.

x	y
-1	
0	
1	
2	

(b) Create a sketch of this function over this interval. Verify by examining the graph that your calculator produces.

x	y
3	
4	



(c) What are the function's minimum and maximum values on this interval?

(d) Over what interval is the function negative? *"below the x-axis"*

(e) For your graph, state the interval over which the function is increasing.

(f) How can this graph help to solve the equation $(x-1)^2 - 4 = -3$? Can you solve this by looking at your table?

Exercise #3: Which of the following is a point where $y = \frac{3}{2}x + 7$ and $y = -5x - 6$ intersect?

- (1) (0, 7)
- (2) (-1, -1)
- (3) (-2, 4)
- (4) (2, 10)

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**EXPLORING FUNCTIONS USING THE GRAPHING CALCULATOR
HOMEWORK/PRACTICE!**

1. Consider the function $g(x) = 3x^2 + 2x - 4$. Evaluate the following using your graphing calculator.

(a) $g(-2) =$

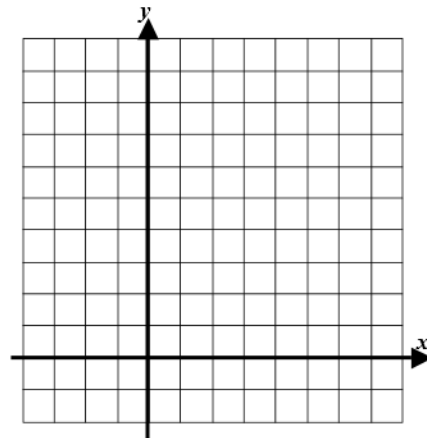
(b) $g(0) =$

(c) $g(4) =$

(d) $g(15) =$

2. Given the function $f(x) = x^2 - 2x + 1$, fill in the missing values in the table then using the table graph the function on the grid for the interval. Use your calculator.

x	y	(x, y)
-2		
		$(-1, 4)$
0		
	0	
2		
3		
	9	



3. Which of the following values of x will make the equation $3(x-2)^2 - 4 = 23$ true? Show the table on your calculator that justifies your choice.

(1) $x = 1$

(3) $x = 5$

(2) $x = 4$

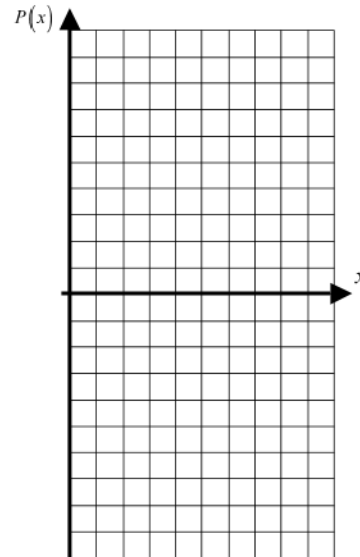
(4) $x = 0$

APPLICATIONS

4. Profits for the upcoming year for a shipping company have been quantified and put into the equation $P(x) = \frac{1}{2}(x-2)^2 - 8$ where x is the number of packages shipped in thousands and $P(x)$ is the corresponding profit in millions of dollars.

(a) Use your calculator to fill out the following table and graph the function on the grid for the interval $0 \leq x \leq 10$.

x	$P(x)$	(x, y)
0		
2		
4		
6		
8		
10		



(b) Over what interval is $P(x) < 0$? What does this interval represent?

(c) Evaluate $P(0)$. What might this stand for?

(d) Explore the table to determine the value of x for which $P(x) = 0$. What might this stand for?

REASONING

5. After placing an equation into his calculator Rob got the following table. He then determines that $x = 6$ when $f(x) = -4$. Is he correct? Explain.

x	$f(x)$
-4	6
-2	3
0	-1
2	-4