SPECIAL FEATURES OF THE TI-83 PLUS CALCULATOR

The TI-83 Plus uses Flash technology: This will let you update to future software versions from the Internet, without buying a new calculator.

184k bytes of memory are built into the TI-83 Plus. About 24k of RAM are available for your to compute and to store functions, programs, and data.

160k bytes of memory user data archive are available for storing data, programs, applications, or any other variables to a protected location where they cannot be edited or deleted by mistake.

CBL/CBR application is installed in the TI-83 Plus. The CBL and CBR with the TI-83 Plus allows you to analyze data from experiments you perform relating to distance, velocity, acceleration, and time.

If you have questions fill free to contact either of us by phone or e-mail.

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Basics for TI83 Plus Calculator:

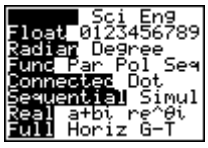
ON Located on the bottom left

OFF 2nd [OFF]

Screen Contrast 2nd hold ▲ to increase contrast

2nd hold ▼ to decrease contrast

Check settings MODE



Form of answer… normal, scientific, engineering notation
Number of decimal places… floating or 0-9
Angle measure … radian or degree
Type of equation… function, parametric, polar, sequence
Plotting mode… connected or dotted
Graphing order… sequential or simultaneous
Results mode… real or complex
Screen mode… Full or split screen

To change a mode setting, cursor to what you want to change then press ENTER

To get off of a screen 2nd [Quit]

Introduction to the keys:

Graphing keys – top row

Enter a function *y* =

Scale for *x* and *y* WINDOW

Zooming in or out ZOOM

Tracing along a graph TRACE

Graphing a function GRAPH

Editing Keys:

Yellow keys	Press 2nd the key you want
Settings	MODE Explained previously
Editing	DEL Deletes highlighted character
	2nd [INS] allows a character to be inserted
	2nd ◄ moves cursor to the beginning of an expression
	2nd ► moves cursor to the end of an expression
	2nd [ENTRY] Pastes last entry on the screen so it can be edited. Repeating this pastes next to last entry on screen then entry before that etc.

Variable keys:

Aqua keys	Press ALPHA then key you want
Standard	X,T,θ,*n* Prints: **x** for function mode **T** for parametric mode **θ** for polar mode ***n*** for sequence mode
Alphabet	in Aqua Press ALPHA then the letter you want

Menu keys:

STAT	Lists, stores, and analyses data
MATH	Many math operations
APPS	Applications
VARS	Variables

Math Operation keys:

Multiplicative inverse	x^{-1}
Squared	x^2
Logarithms	LOG LN
Trig	SIN COS TAN 2^{nd} [SIN^{-1}] [COS^{-1}] [TAN^{-1}]

Arithmetic for TI-83 Plus Calculator:

Order of Operations:

( ) Operations inside parentheses are executed first, beginning with the inner most parentheses. The total number of parentheses facing left must be the same as the number of parentheses facing right or an error will occur.

^ Exponential operations are executed next

x / ÷ Multiplication OR division should be executed next. They are executed in order from left to right as you move across the expression or function.

+ / - Addition OR subtraction should be executed last. They are executed in order from left to right as you move across the expression or function. NOTE: The calculator is sensitive to the difference between the subtraction sign and the negative sign. If you look closely you can tell the difference on the display because the negative sign is shorter and slightly higher than the subtraction sign. See Example #1.

NOTE: If you make an error while typing an expression before you hit ENTER, it is not necessary to retype the entire expression. Use the arrow keys to position the cursor so it is blinking on top of the mistake. Hit the correct key or if you have omitted a character(s), then hit 2nd [INS] to insert the additional character(s) or use DEL to delete individual characters. If you have already hit ENTER and then notice there's a mistake, hit 2nd [ENTRY] to retrieve the last line, then use the arrow keys to position the cursor. (You can keep hitting 2nd [ENTRY] repeatedly to go back several lines.)

If you get this message:

Scroll down to 2: Goto, press ENTER, the cursor will be blinking on top of your mistake.

TI – 83 PLUS HANDOUT

Example	Expression	Keystrokes	Answer
1.	$-2-6$	(-) 2 - 6 ENTER	-8
2.	$2+3\bullet 6$	2 + 3 X 6 ENTER	20
3.	$(2+3)6$	(2 + 3) 6 ENTER	30
4.	$-12\div 4\bullet 3$	(-) 1 2 ÷ 4 x 3 ENTER	-9
5.	$-12\div(4\bullet 3)$	(-) 1 2 ÷ (4 x 3) ENTER	-1
6.	$\dfrac{3\bullet 4^2-5}{5^3+6}$	(3 x 4 x^2 - 5) ÷ (5 MATH 3 + 6) ENTER	.3282442748
		If you want the answer as a fraction, press MATH 1 ENTER	43/131
7.	$4\left\|3-7\left(4^2+5\right)\right\|$	4 MATH ▶ NUM 1 3 - 7 (4 x^2 + 5)) ENTER	576
8.	2π	2 2nd [π] ENTER	6.283185307
9.	$\sqrt[3]{64}$	MATH 4 6 4) ENTER	4
10.	$\sqrt[5]{32}$	5 MATH 5 3 2 ENTER	2
11.	$32^{3/5}$	3 2 ^ (3 ÷ 5) ENTER	8
12.	e	2nd [e] ENTER	2.718281828
13.	e^3	2nd [e^x] 3) ENTER	20.08553692
14.	log(1000)	LOG 1 0 0 0) ENTER	3
15.	ln (5^{-1})	LN 5 ^ (-) 1) ENTER	-1.609437912
16.	sin $(\frac{\pi}{2})$	SIN 2nd [π] ÷ 2) ENTER	1
17.	cos(0)	COS 0) ENTER	1
18.	$\sin^{-1}\left(\frac{1}{2}\right)$	2nd [$\sin^{-1}$] 1 ÷ 2) ENTER	.5235987756
		÷ 2nd [π] MATH 1 ENTER	$\frac{1}{6}$

So, $\sin^{-1}(\frac{1}{2})=\frac{1}{6}\pi$

Example	Expression	Keystrokes	Answer
19.	$\cos^{-1}(-\frac{\sqrt{2}}{2})$	2nd [COS^{-1}] (-) 2nd [$\sqrt{\ }$] 2) ÷ 2) ENTER	2.35619449
		÷ 2nd [π] MATH 1 ENTER	$\frac{3}{4}$
		So, $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)=\frac{3}{4}\pi$	
20.	$(-4)^{\frac{1}{2}}$	((-) 4) ^ (1 ÷ 2) ENTER	ERR:NONREAL ANS 1. Quit 2. GoTo
21.	$5000\left(1-\frac{4}{4+e^{-.002(100)}}\right)$		
		5 0 0 0 (1 - 4 ÷ (4 + 2nd [e^x] (–) . 0 0 2 (1 0 0)))) ENTER	849.5294664
		OR	
		(–) . 0 0 2 * 1 0 0 ENTER	-.2
		2nd [e^x] 2nd [ANS]) + 4 ENTER	4.818730753
		4 ÷ 2nd Ans ENTER	.8300941067
		1 - 2nd Ans ENTER	.1699058933
		* 5 0 0 0	849.5294664

Probability

The factorial key is under MATH. Use your cursor to scroll over the highlight PRB. Choose 4:!.

The permutations and combinations key are also both under MATH. Highlight PRB. Choose 2:nPr or 3: nCr.

Expression	Keystrokes	Answer
6!	6 MATH ◄ PRB 4 ENTER	720
P(8,3)	8 MATH ◄ 2 3 ENTER Calculator display: 8 nPr 3	336
C(9,6)	9 MATH ◄ 3 6 ENTER Calculator display: 9 nCr 6	84

EXERCISES

Problem	Calculator Display	Answer
1. $\frac{3}{5}+\frac{7}{11}$	3/5+ 7/11►Frac	68/55
2. $\frac{3}{5}x\frac{7}{11}$	3/5 * 7/11►Frac	21/55
3. $625^{-1/4}$	625^(−1/4) ► Frac	1/5
4. $\log_8(2)$	log (2)/log(8)►Frac	1/3
5. $\frac{\frac{1}{3}+\frac{3}{5}}{\frac{3}{2}+\frac{7}{9}}$	(1/3+3/5) / (3/2+7/9)►Frac	84/205
6. $\sin\left(\frac{3\pi}{5}-\frac{1}{3}\right)$	sin (3π/5−1/3)	.9998161832
7. $2\pi\sqrt[4]{45}\ e^{4.2}$	$2\pi 4\sqrt[x]{}(45)e$^(4.2)	1085.225077
8. ln (3+$4^{-0.3}$)	ln (3 + 4 ^ -.3)	1.29739592
9. $(-8)^{2/3}=$	(-8)^ $(2/3)$	4
10. $-8^{2/3}$	- 8 ^ (2/3)	-4
11. $4^{-3/2}$	4 ^ (-3/2) ►Frac	1/8
12. $\sqrt[3]{-125}$	$\sqrt[3]{}$ (-125)	-5
13. $\frac{-6+\sqrt{20}}{-2}$	(-6+$\sqrt{}$(20))/−2	.7639320225

Perform the following operations using a graphing calculator. "i" is located above the decimal.

	Problem	**Calculator display**	**Answer**
14.	$(4+5i)+(-8+2i)$	$(4+5i)+(-8+2i)$	$-4+7i$
15.	$(3-4i)-(-3-4i)$	$(3-4i)-(-3-4i)$	6
16.	$(-8+4i)-(2-2i)$	$(-8+4i)-(2-2i)$	$-10+6i$
17.	$-4(2+8i)$	$-4(2+8i)$	$-8-32i$
18.	$2i(2-3i)$	$2i(2-3i)$	$6+4i$
19.	$(5+3i)(2-i)$	$(5+3i)(2-i)$	$13+i$
20.	$(6+5i)(6-5i)$	$(6+5i)(6-5i)$	61
21.	$\frac{10}{3-4i}$	$10/(3-4i)$	1.2+1.6i or 6/5 + 8/5i
22.	$\frac{2-i}{-2i}$	$(2-i)/(-2i)$	$.5+i$
23.	$\frac{2+3i}{1-i}$	$(2+3i)/(1-i)$	-.5 + 2.5i
24.	$\left(\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)^3$	(1/2 + $\sqrt{\ }$ (3)i / 2)^3	- 1
25.	$(1+i)^2$	$(1+i)^2$	2i
26.	i^{23}	i^23	3E-13 – i
27.	i^6	i^6	- 1

Introduction To Graphing

Some or all of these steps are necessary to graph a function.

1. Check the settings by pressing MODE.
2. Press y =. Clear or deselect functions already defined.
3. Deselect stat plots.
4. Type function.
5. Press WINDOW to define viewing window.
6. Press GRAPH.
7. Adjust window if necessary.

Example 1: Graph $y = 2x^2 - 16x + 25$ in $[-10,10]x[-10,10]$ window

Type the function for Y_1. Set window. Press GRAPH. Does the graph look like you expected? Press TRACE. The cursor should be on the *y* intercept. Move cursor along the graph by pressing the left and right cursor keys. Notice that the function is displayed in the upper left-hand corner and the coordinates are displayed on the bottom. Estimate the minimum point _____ and the zeros _____ _____ by moving the cursor to these.

Now press 2nd [CALC] 3:MINIMUM. Left Bound? is displayed in the bottom left hand corner. Move the cursor to a point on the left side of the vertex or select a value. Press ENTER. Now Right Bound? is displayed on the bottom left hand corner. Move the cursor to a point on the right of the vertex or select a value. Press ENTER. Guess? appears on the bottom left. Press ENTER. The coordinates of minimum are displayed. How do these compare to the coordinates you got when you were using trace?

You can get the zeros in a similar way. Press 2nd [CALC] 2:zero. Set a left bound, right bound, and guess around one of the x intercepts. Repeat for the other x intercept. How does this compare to the coordinates above?

Where is the function decreasing? _____
Where is the function increasing? _____
Where is the function positive? _____
Where is the function negative? _____

How can you check these values? _____

Example 2: Graph $y = 4x - 3$ on the same graph.

Press y=. Cursor down to Y_2. Type in 4x-3. Press GRAPH.
How many intersection points are on the display? _____
How many intersection points are there for these two graphs? _____
Adjust the window so all intersection points will be displayed.
What window settings did you use? _____

To find the coordinates of the points of intersection press [2nd] [CALC] 5: intersect. First curve? is displayed in the bottom left corner. If necessary use the up or down cursors to move the cursor to one of the functions, press [ENTER]. The cursor may be on one of the curves. The function will be displayed on the top left. Second curve? is displayed in the bottom left corner. Use the up or down cursors to move the cursor to the other function, if necessary, then press [ENTER]. Guess? is displayed in the bottom left corner. Press [ENTER]. You don't have to make a guess. The cursor will move to an intersection point and the coordinates are displayed on the bottom. Press [TRACE]. Move the cursor close to the second intersection point and repeat this procedure. What are the points of intersection? _____. How can you verify this analytically?

Example 3: Shading inside $y = 2x^2 - 16x + 25$, in other words, graph $y \geq 2x^2 - 16x + 25$

Press [y=], move cursor to left of Y_1. The symbol should be blinking. Press [ENTER] until ◥ appears. Move cursor to equal sign of Y_2. Press [ENTER] to turn off Y_2. Press [GRAPH]. To graph $y \leq 2x^2 - 16x + 25$ move the cursor to the left of Y_1 and press [ENTER] until ◣ appears. Press [GRAPH].

Example 4: Draw the inverse of $y = 4x - 3$.

Turn off $y = 2x^2 - 16x + 25$ equation. Change window to the standard window by pressing numbers or use [ZOOM] [6]. Turn on Y_2 and graph $y = 4x - 3$. Press [2nd] [DRAW] 8: DrawInv. The home screen will be displayed. Press [VARS]. HighlightY—VARS. Press 1: Function then Press 2:Y_2 [ENTER]. The inverse of Y_2 is drawn. Does this work for one to one functions only? Repeat this procedure for $y_1 = 2x^2 - 16x + 25$ (Don't forget to change symbol left of Y_1 back to normal.)

Example 5: Graph a circle $x^2 + y^2 = 16$

This is not a function. To graph the equation you must separate this into 2 functions that form the circle. Clear the equations in your calculator. Set the window settings for the standard window.

Type in $y_1 = \sqrt{(16 - x^2)}$

$y_2 = -\sqrt{(16 - x^2)}$ or $-Y_1$

Press [GRAPH]

To change window to get the proper proportions, press [ZOOM] 5: Z square.

Example 6: Graph a rational function $y = \dfrac{2x^2 - 3x + 4}{x - 2}$

Press [y=]. Clear functions. Type in the rational function for Y_1. Type in the slant asymptote $y = 2x + 1$ for Y_2. Set window to [-10,10] x [-10, 25]. Press [GRAPH]. Does Y_1 intersect the asymptote? Press [ZOOM] 1:ZBox This defines a new viewing window by drawing a box around a portion of the graph and then redraws the portion in the box on the whole screen changing the X-min, X-max, Y-min and Y-max accordingly. Move the cursor to a point near (7,22), press [ENTER]. This defines one corner of the box. Move the cursor to a point near (10, 14). Press [ENTER] to re-plot that portion of the graph.

Check the window settings. Reset window to [-10, 10] x [-10, 25]. Press [2nd] [TBLSET] set TblStart to –5, Δ Tbl to 1, Indpnt: to Auto and Depend: to Auto. Press [2nd] [TABLE]. This gives x and y coordinates on the graph. Notice when x=2 ERROR is given for Y_1 in the table. Why? Scroll through the table to see how Y_1 and Y_2 get closer together as $x \to \infty$.

Example 7: Graphing a Piecewise Function $y = \begin{cases} x^2, x \le 1 \\ -2x + 3, x > 1 \end{cases}$

Press [y=]. Clear functions. Type in [(] [X,T,θ n] [x^2] [)] [(] [X,T,θ n] [2nd] [TEST] 6:≤ [1] [)] [+] [(]

[(-)] [2] [X,T,θ n] [+] [3] [)] [(] [X,T,θ n] [2nd] [TEST] 3 :> [1] [)]. The general form for piecewise function is (function) (domain) + (function) (domain) + (function) (domain), etc. Set window [-5,5] x [-5,5] Press [GRAPH].

To type a domain such as $-2 < x < 1$, type $(-2 < x)(x < 1)$ or type $(-2 < x \, and \, x < 1)$

Example 8: Solve $|x + 5| < |x|$
How would you do this?

You could graph each. $y_1 = |x + 5|$ and $y_2 = |x|$. Remember, absolute value is under [MATH] NUM. Try this. What is the solution? _____

You could graph $y = |x + 5| - |x|$. Or use $Y_1 - Y_2$. Try this for Y_3. Turn off Y_1 and Y_2.
What is the solution? _____

Example 9: Graph $f(x)=\dfrac{x^3+2x^2-9x-18}{x^2+2x-3}$

a. What are the asymptotes? _____

b. What is the domain? _____

c. What is the range? _____

d. What are the zeros? _____

Answers for **Example 9.**
a. x=1, y=x
b. $x \neq 1,-3$
c. all reals
d. (3,0) (-2,0)

Graphing Exercise

Graph the following functions. Determine a good viewing window. Find the zeros for exercises 1 - 9.

1. $y = x^3 + 3x^2 - x - 3$
2. $y = \sqrt{x^3 - 8x}$
3. $y = 3\cos 2x$
4. $y = xe^{2x-3}$
5. $y = \ln(3-x) + 2$
6. $y = |5 - 2x\ |$
7. $y = \dfrac{2x+3}{x^2-4}$
8. $y = \dfrac{x^2+5x+6}{x^2-4}$
9. $f(x) = \begin{cases} -3x^2 + x, x < 2 \\ |x-4|, x \geq 2 \end{cases}$

10. Estimate the intersection points for the system of equations $y = x^3 - 2x$ and $y = 2\cos x$

Statistics:

Mean, Median, Mode, and Standard Deviation

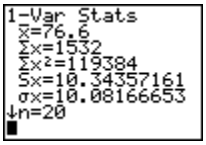
To find the mean, median and mode of the following 20 exam scores:

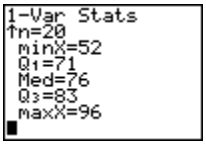
Exam Scores

76	74	82	96	66	76	78	72	52	68
86	84	62	76	78	92	82	74	88	70

To Enter above list in L_1:

A. Press STAT. The first selection, Edit, will be highlighted. Press ENTER.
B. Type above scores under L_1, pressing ENTER after each score.
C. Press STAT , cursor right to CALC, select 1: 1-VarStats
D. Press ENTER (if data is under L_1). If data is under any other List type 2nd and the name of that list





Mean: $\bar{x}$
Sample standard deviation: Sx
Population standard deviation: σx
Scroll down to find median: med
To find Range: max X – min X
To find mode: go to STAT, press 2: sort A (press 2nd [L_1]. This puts list in ascending order. Press STAT . Edit will be highlighted, press ENTER, scroll down to find mode.

Drawing a Box-and-Whisker Plot

A. Press 2nd [STAT PLOT], press 1 to select Plot1 and press ENTER to turn on Plot1.
B. Using the right arrow scroll through the TYPE options and choose the second box plot, which is the middle entry in row 2 of the TYPE option. Press ENTER.
C. Move cursor down to Xlist and type in [L_1], press ENTER.
D. Move cursor down to Freq. If Freq is set on L_2, press CLEAR, then press ALPHA to return the cursor to a flashing solid rectangle. Type in 1.
E. Press ZOOM and 9 to select ZoomStat.

The boxplot will appear on your screen. Trace to move left and right to display minX, Q1, Med, Q3 and maxX. The values of each will appear at the bottom of the screen.

Regression Models:

The TI-83 is capable of performing several different regression models. The models are…

Linear Regression:	$y = ax + b$
Quadratic Regression:	$y = ax^2 + bx + c$
Cubic Regression:	$y = ax^3 + bx^2 + cx + d$
Quartic Regression:	$y = ax^4 + bx^3 + cx^2 + dx + e$
Natural Log Regression:	$y = a + b(\ln x)$
Exponential Regression:	$y = ab^x$

In order to calculate r, the correlation coefficient, you must turn on the Diagnostic command the first time you draw a scatterplot.

Press 2nd [catalog] (alpha will already be on) type [D], scroll down to DiagnosticsOn, press ENTER ENTER. Calculator displays "Done" when the command has been executed. This will remain on until you turn it off.

How To Enter Statistical Data:

Step 1: To clear any old values in the lists you want to use.

A. Press STAT
B. Press 4 to select ClrList, Select L_1 and L_2 by pressing 2nd [L_1], 2nd [L_2] ENTER
(Note: Put a comma between each)

Step 2: Suppose your statistical data is:

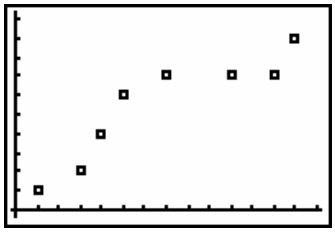
X: 1, 3, 4, 5, 7, 10, 12,13
Y: 1, 2, 4, 6, 7, 7, 7, 9

To store the X-values in L_1 and the Y-values in L_2

A. Press STAT
B. Press 1 to select Edit
C. Type X data under L_1, pressing ENTER after each
D. Press ▶
E. Type Y data under L_2 , pressing ENTER after each
F. Press 2nd [QUIT] when finished

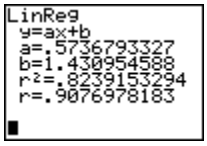
Step 3: To draw a scatterplot for the data:

A. Press y= clear any existing functions
B. Press 2nd [STAT PLOT] ENTER. Cursor will be blinking over ON.
C. Press ENTER to turn Plot 1 on. Scroll down to type: highlight the first symbol for scatterplot, press ENTER.
D. Scroll down to X list: type 2nd [L_1].
E. Scroll down to Y list: type 2nd [L_2].
F. Scroll down to Mark: highlight which size mark you prefer then press ENTER.
G. Press ZOOM and 9 for ZoomStat. Your scatterplot should appear on screen.



Step 4: To calculate the equation of the regression line and correlation coefficient for your data:

A. Go to Y=. Make sure all functions are cleared.
B. Press STAT. Scroll right to highlight CALC.
C. Press 4 to select LinReg $(ax+b)$. Press 2nd L1 , 2nd L2 , VARS , scroll right to Y-VARS, press 1 to select Function. Press 1 to select Y_1. This should paste Y_1 after L_1, L_2, Y_1, press ENTER. Your linear regression equation is shown on your home screen along with *r*, the correlation coefficient. Your equation for the line of best fit is pasted under y = by the Y_1 function.



Sort Lists

If you have one or more lists stored in your calculator and you want to arrange them in ascending or descending order:

Step 1: Press STAT

Step 2: Press 2 to select Sort A (or Press 3 to select Sort D(

Step 3: Type 2nd [L_1] , 2nd [L_2], etc for all of the lists you wish to sort

Step 4: Press ENTER

Personalize Your List:

To create a title for your list:

Step 1: Press STAT

Step 2: Press 1 to select Edit

Step 3: Press ▲ 2nd [INS]

Step 4: Type in the name for the new list and press ENTER.

Note: the name must contain no more than 5 characters and must begin with a letter.

Inequality Worksheet

Suppose we want to solve the inequality $x^2 \le 3x + 10$

We will do this two ways, algebraically and graphically.

Algebraically

1. Get a zero on one side of the inequality by moving all terms to one side. Arrange these terms in descending order. $x^2 \le 3x + 10$ _____ ≤ 0

2. Find the zeros of the polynomial by factoring the polynomial, setting each factor equal to zero, and solving. Zeros= _____

3. Use the zeros to divide the number line into three intervals. Select a test number in each interval to substitute into the inequality. _____

4. Determine if the inequality is true or false for each substitution and mark the corresponding interval accordingly.

5. The solution set includes all intervals marked true.

6. Write the solution set. Solution set = _____

Graphically

Now let's solve $x^2 \le 3x + 10$ graphically.

1. Let Y_1 equal to the left side of the inequality and Y_2 equal to the right side. Y_1= _____ Y_2= _____

2. Graph Y_1 and Y_2 on the same screen so that you can see all intersection points. Find the intersection points. This is where $Y_1 = Y_2$. Intersection points _____

3. How can you use the graph to determine where $Y_1 < Y_2$ and where $Y_1 > Y_2$? _____ _____ _____

What is the solution of $x^2 \le 3x + 10$? Solution set = _____

Is this the same solution set you found algebraically? Should it be?

Inequality Worksheet Page 2

Try these. Find the solution set of each algebraically and graphically.

a) $x^2 + 7x < -12$ b) $4x^2 + 9 < 6x$

Now let's solve a rational inequality **graphically**.

$$\frac{3x-5}{x-3} \geq 2$$

Fill in the steps to do this

1. 1.

2. 2.

3. 3.

Try these.

c) $\frac{x+4}{x-2} \leq 1$ d) $\frac{2x+5}{x+1} > \frac{x+1}{x-1}$

Graph Transformations Worksheet

At this point, you should be able to draw a quick sketch of

$y = x, y = x^2, y = x^3, y = \sqrt{x}, y = |x| \text{ and } y = \frac{1}{x}$

Graph $y = x^2$ for Y_1 in the standard window.

Begin with problem 1, graphing it as Y_2 leaving Y_1 turned on so you can compare Y_2 to Y_1. Fill in the first row of the chart. Sketch the graph, compare Y_2 to Y_1 then describe the relationship, and state the domain and range of Y_2. Repeat this process for problems 2, 3, and 4.

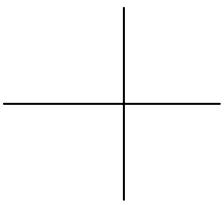
Function	**Sketch Graph**	**Relationship to $Y_1=x^2$**	**Domain and Range of Y_2**
1. $Y_2 = x^2 + 3$			
2. $Y_2 = x^2 - 3$			
3. $Y_2 = x^2 - 7$			
4. $Y_2 = x^2 + 5$			

How is the constant that is added to or subtracted from x^2 shifting the graph?

_____

_____

5. Sketch $y = x^2 + 2$ by hand



Check it with the calculator. Were you correct?

Graph Transformations Worksheet Page 2

Graph these functions for Y_2 with $Y_1 = x^2$ turned on. Fill in the chart.

Function	**Sketch of Graph**	**Relationship to $Y_1 = x^2$**	**Domain and Range of Y_2**
6. $Y_2 = (x + 3)^2$			
7. $Y_2 = (x - 3)^2$			
8. $Y_2 = (x - 7)^2$			
9. $Y_2 = (x + 5)^2$			

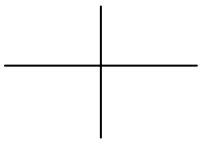
How is the constant that is added to or subtracted from *x* and then squared shifting the graph?

_____

_____

_____

10. Sketch $y = (x + 2)^2$ by hand



Check with the calculator. Were you correct?

11. How do you think the graph of $y = (x - 2)^2 - 3$ will be shifted from the graph of $y = x^2$?

_____

_____

Graph the function of your calculator. Were you correct? If not, describe the shift.

_____

12. If $y = x^2$ is called the parent function, then for any graph of the form $y = (x + b)^2 + c$ describe how b and c shift the parent function._____

_____

Linear Regression Worksheet

A person wanted to determine if there was a relationship between speed and miles per gallon of a SUV. Let r represent the independent variable and mpg the dependent variable.

r	50	55	55	60	60	62	65	65
mpg	28	26	25	22	20	20	17	15

A) Does the relation defined by the set of ordered pairs (r,mpg) represent a function? _____

B) Select two points from the data and find the slope. (___, ___) (___, ___) _____

C) Interpret the slope _____

D) Find the equation of the line through the points selected in part (B). _____

E) Use a graphing calculator to draw a scatter diagram.

F) Graph the line found in part (D) on the scatter diagram.

G) Does this line appear to "fit" the data well?

H) Compare your graph and equation with someone else.

I) Use your graphing calculator to compute the line of best fit. (Execute the Linear Regression program).

J) Using a graphing calculator to graph the line of best fit found in part (I) on the Scatter diagram.

K) How does the calculator's line of best fit compare to the equation you found and graphed in parts (D) and (F)?

L) Predict the miles per gallon of an SUV traveling i) 63 miles per hour. _____

ii) 70 miles per hour _____

Histogram Worksheet

The following frequency table provides the IQ scroes of the students enrolled in College Algebra at a local college.

IQ	MIDPOINT	NUMBER OF STUDENTS	RELATIVE FREQUENCY
85 – 89		2	
90 – 94		5	
95 – 99		13	
100 – 104		16	
105 – 109		15	
110 – 114		11	
115 – 119		8	
120 – 124		3	

To Create A Histogram:

1. Go to STAT press 1 to select EDIT.
2. To clear lists, move your cursor so that the list name (L1, L2, etc.) of the list that contains data is highlighted. Press CLEAR ENTER. Repeat this process until all lists are clear.
3. Enter the midpoints of the IQ score under L1. Be sure to press ENTER after each entry.
4. Enter the frequency (number of students) under L2.
5. To graph a histogram, press 2nd [STAT PLOT].
6. Press 1 to select Plot 1…ON. The cursor will be blinking on "ON", press ENTER to turn on PLOT 1.
7. Move cursor down to TYPE: move cursor right to highlight the 3rd item on the lst line of Type (symbol for histogram). Press ENTER.
8. Move cursor down to next line Xlist: this should read L_1 to show where the midpoints are stored. If it doesn't, press 2nd [L_1].
9. Move cursor down to next line Freq: Press 2nd [L_2].

10. Press ZOOM. Press 9 to select ZoomStat.
11. To adjust the histogram, press WINDOW and change X-min to 87, X-max to127 (this extra midpoint is needed to complete the picture), and X-scl to 5, which is the differrence between successive midpoints.

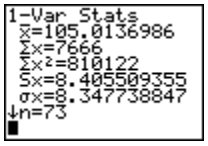
Histogram Worksheet, page 2

12. Press GRAPH to see histogram.
13. Press TRACE , notice the cursor is blinking at the top of the first bar of the histogram. At the bottom of the screen the smallest midpoint is displayed (min) and the number of data points (freq.) in that bar is displayed as n = 2. Scroll right to move through each of the bars.
14. How many students have an IQ between 100 and 104? _____
15. How many students have an IQ above 110? _____
16. How many students are enrolled in College Algebra? _____
17. The formula for the mean of a frequency distribution is: $\bar{x} = \frac{\sum(x \cdot f)}{n}$, where x and f are the midpoints and frequencies of a class, respectively.
18. Go to STAT, press 1 to select EDIT.
19. Scroll right to L3. Move cursor up to highlight L3. Press 2nd [L1] x [L2] ENTER . This will fill in the L3 column with the product of each midpoint and frequency.
20. Press 2nd [QUIT].
21. Press 2nd [LIST] , scroll right to highlight MATH. Press 5 to select sum (.
22. Press 2nd [L3]) ENTER. The display shows 7666 which is $\sum(x \cdot f)$
23. Repeat Step 21.
24. Press 2nd [L2] ENTER. The display shows 73 which is the total number of College Algebra students enrolled.
25. Type in 7666 ÷ 2nd [ANS] ENTER. The display shows 105.0136986 which is the mean.

Now we will let the calculator compute the mean.

26. Press STAT, scroll right to highlight CALC. Press 1 to select 1-VarStats.
    Press 2nd [L1] , 2nd [L2] ENTER.

Check you answer in step 25 with calculator's mean and sum of frequencies. Scroll down to display minimum, Quartile 1, median, Quartile 3, and maximum.



Histogram Worksheet, Page 3

To Create A Relative Frequency Histogram:

1. Fill in the relative frequency column, on page 20, by dividing each frequency (number of students) by the total number of students found in Step 24.

Now, we'll show you how the calculator can do this for you.

2. Press STAT and ENTER to select Edit. Scroll right and up so the cursor highlights L3. Press CLEAR and ENTER to clear the data in L3.
3. Scroll up to highlight L3 again. Press 2nd [L2] ÷ 73 ENTER. L3 now shows the relative frequency for the data. Check these numbers with the relative frequency column you filled in by hand. Are they the same?
4. Press 2nd [STAT PLOT]. Press ENTER to select Plot 1. Scroll down to Freq: and change L2 to L3 and press ENTER
5. Press WINDOW. Change Ymin to -.1, Ymax to .28 and Ysc1 to .04. Press GRAPH.
6. Press TRACE . The cursor is blinking at the top of the first bar.

At the bottom of the screen the smallest midpoint is displayed (min) . and the "n" represents the relative frequency. Scroll right to move through each of the bars.