ALGEBRA II ACTIVITY 12:
"EYEING" THE MEDIAN-MEDIAN LINE
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ACTIVITY OVERVIEW:
In this activity we will
- Create a scatter plot with paired data
- Use the DRAW menu and Inequality Graphing App to manually estimate the median-median line
- Use the regression menu to find the median-median line

Temp (°F)	75	78	79	83	84	84	87	87	89	90	93	98	101
Lemonade (gal)	30	25.5	28	32	31	32.5	37	40	38	38.5	41	47	42.5

Above is a table that shows the amount of lemonade sold at the baseball tournament concessions related to the temperature during the day. Press [STAT] [ENTER] and enter these data into lists 1 and 2.

Set up a scatter plot to view the relationship between temperature and gallons of lemonade served. Press [2nd] [Y=] [ENTER]. Turn Plot 1 **On**. The default settings are correct for this activity.

Set the window in order to view the graph. Press [WINDOW]. Set the window as shown.
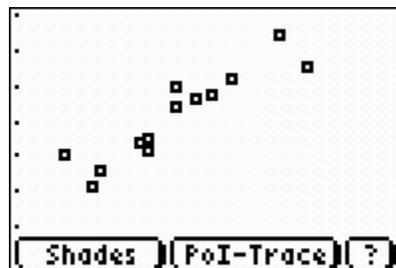
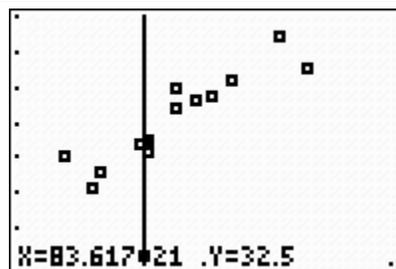|	
Before viewing the plot, take a moment to turn on the Inequality Graphing App. It will be used later in the activity to graph vertical lines. Press [APPS]. Select **:Inequalz** and press [ENTER].	**APPLICATIONS** ↑Inequalz :LearnChk :LogIn :Nederlan :NoteFlio :OrganEsp ↓OrganFra
Press any key as instructed. You will be taken to the screen shown.	X= **Plot1** Plot2 Plot3 \Y₁■ \Y₂= \Y₃= \Y₄= \Y₅= \Y₆= (=)(<)(≤)(>)(≥)
Press [GRAPH]. How would you describe the relationship between temperature and gallons of lemonade served?	[Shades][PoI-Trace][?]
Next you will follow a procedure to find the median-median line (a trend line) for this relationship. The first step is to visually separate the points into three equal regions moving from left to right. This data set has 13 points, so the regions will contain 4, 5, and 4 points. Press [2nd][PRGM] to access the DRAW menu. Select **4:Vertical**.	**DRAW** POINTS STO 1:ClrDraw 2:Line(3:Horizontal **4:**Vertical 5:Tangent(6:DrawF 7↓Shade(
A vertical line will appear. Use right and left arrows to position the line to show the first third of the points. Press [ENTER] to drop the line.	X=83.617•21 .Y=32.5
Immediately use the right arrow to move another line to separate the middle from the final third. Press [ENTER] to drop the line.	X=90 . Y=32.5
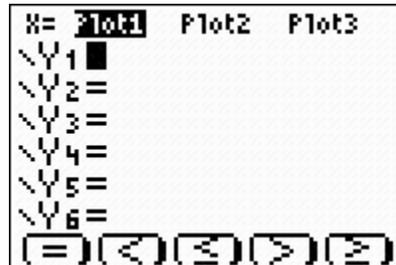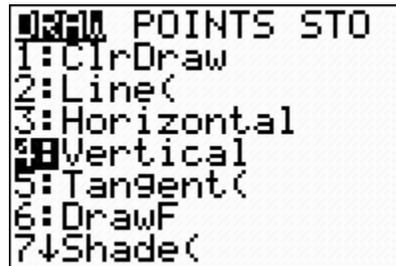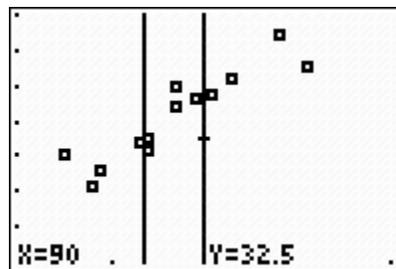
The next step is to examine each third to find the "point" that has the median *x*-value and median *y*-value for that section. Press TRACE. In the first section, move to the points that are in the middle horizontally. These points are (78, 25.5) and (79, 28). The median of the *x*-values is **78.5**. Move to the points that are in the middle vertically. These points are (79, 28) and (75, 30). The median *y*-value is **29**. Make note of the median values.
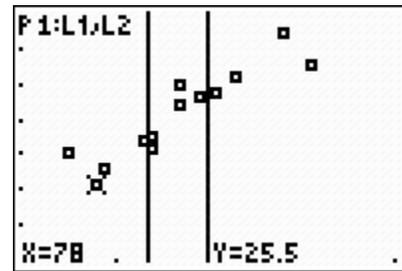
In the last section, move to the points that are in the middle horizontally. These points are (93, 41) and (98, 47). The median of the *x*-values is **95.5**. Move to the points that are in the middle vertically. These points are (93, 41) and (101, 42.5). The median *y*-value is **41.75**. Make note of the median values.
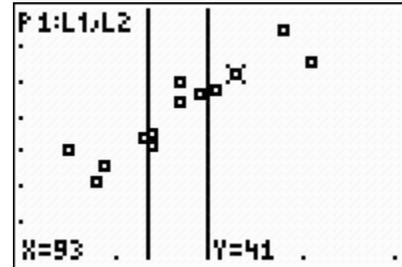
The middle section contains five points. The same point represents the middle *x*-value as the middle *y*-value. Make note of this point, (87, 37).
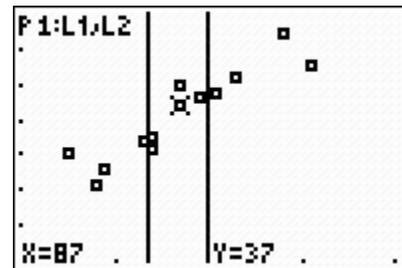
Press Y=. Enter the median *y*-value for the first section, 29, into Y_1. Enter the median *y*-value for the last section, 41.75, into Y_2.
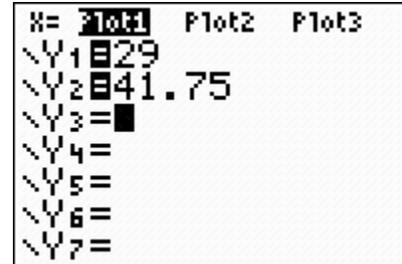
The reason you have engaged the Inequality Graphing APP is to be able to graph vertical lines in exact locations. Press the up arrow to the **X=** icon in the top left corner. Press ENTER. Enter the median *x*-value for the first section, 78.5, into X_1. Enter the median *x*-value for the last section, 95.5, into X_2.
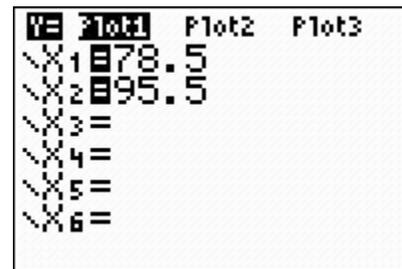
Press GRAPH. What is the significance of the intersections of these lines?
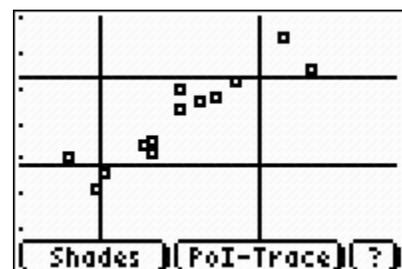
|	DRAW POINTS STO 1:ClrDraw 2:Line(3:Horizontal 4:Vertical 5:Tangent(6:DrawF 7↓Shade(
The next step is to graph the line that connects the median-median point in the first section, (78.5, 29) to the median-median point in the last section, (95.5, 41.75). Press 2nd PRGM to access the DRAW menu. Select **2:Line(**.	

| A "cross-hair" cursor will appear. Move the cursor to the point (78.5, 29) and press ENTER to drop the start of the line. Move the cursor to the point (95.5, 41.75), watching the line appear. Press ENTER to drop the end of the line. (If desired you could use the two points to calculate the equation of this line.)	

Shades ‖(PoI-Trace)‖(?)
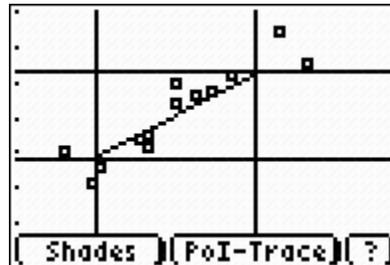
The last step in seeing the median-median line is to shift it one-third of the distance toward the median-median point for the middle section. Press TRACE. In the middle section, move to the median-median point that you found earlier, (87, 37). Can you imagine the location of your line segment if you shifted it up slightly? Rather than try to draw this line, use a built-in calculator routine to find the median-median line.	 P1:L1,L2 X=87 .Y=37
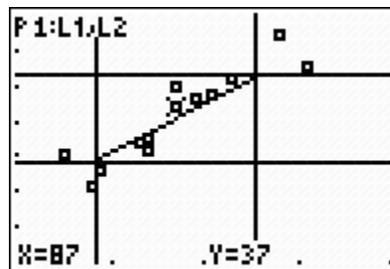
Now that you understand the process for determining the median line, the calculator can find this line quickly. Press STAT ▶ to access the **CALC** menu. Select **3: Med-Med**.	EDIT **CALC** TESTS 1:1-Var Stats 2:2-Var Stats 3:Med-Med 4:LinReg(ax+b) 5:QuadReg 6:CubicReg 7↓QuartReg

The command will be pasted on the home screen. To command the calculator to find a median-median line for the data in lists 1 and 2 and store the equation in Y_3, press the following key sequence so your screen will look like the one shown: 2nd 1 , 2nd 2 , VARS ▶ 1 3	Med-Med L₁,L₂,Y₃

Press ENTER to execute the command.	Med-Med y=ax+b a=.75 b=-29.33333333

Press GRAPH to see the median-median line graphed with your data points and your median-median points. Is this line located where you expected it to be? When is the median-median line preferable to the least-squares line for modeling a set of data?