

Halloween Drawing

Teacher Notes and Answers

7 8 9 10 11 12



Introduction

Cartesian coordinates are a way of identifying the location of points on a 2 dimensional plane (x,y) or in 3 dimensional space(x,y,z). We can use these points systematically to construct diagrams and/or pictures. In the activity you will use your mathematical and artistic skills to create an image. We will start with a simple image then move you to a more challenging one. Then you will be able to construct your own using the skills and knowledge you gain.

Drawing a Square

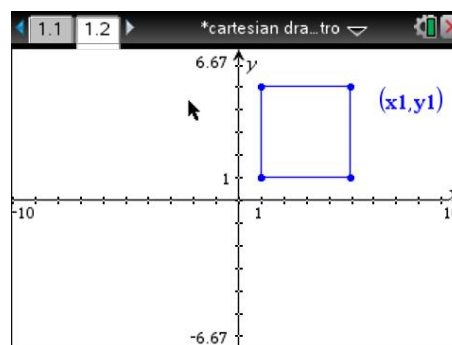
Here is a diagram of the square that you will draw.

Firstly, you must identify the points used to create the image. In this case the four vertices of the square.

The four vertices' coordinates are:

(1 , 5) (5 , 5) (5 , 1) (1 , 1)

Let's write them in a tabular form.



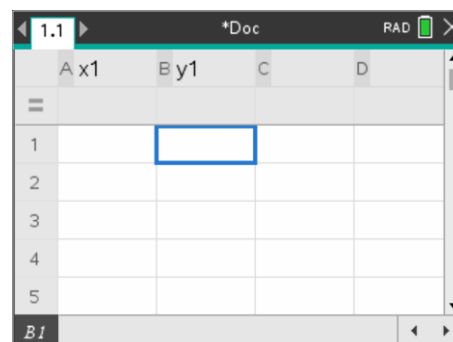
Be systematic, write them in the order you would follow if you were joining each point to the previous one.

For our first image this will be all the data you require.

x	y
1	5
5	5
5	1
1	1

Drawing a square on your calculator:

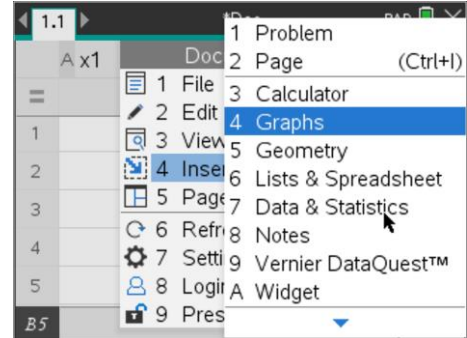
Insert a Lists and Spreadsheet application into a new document and name the first two columns: x1 and y1



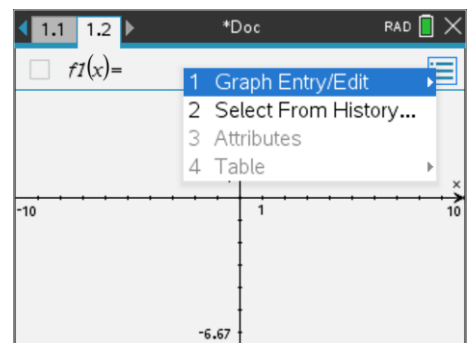
It is here that you enter the coordinates.

	A x1	B y1	C	D
=				
1	1	1		
2	1	5		
3	5	5		
4	5	1		
5				

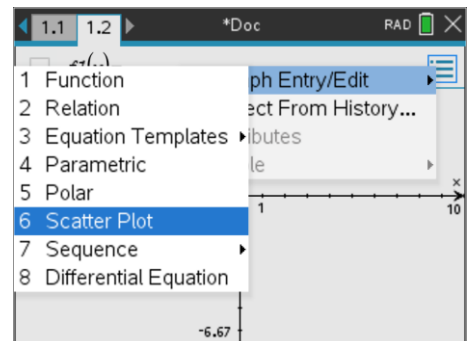
Now add a Graphs application, this is where the *drawing* will be displayed.



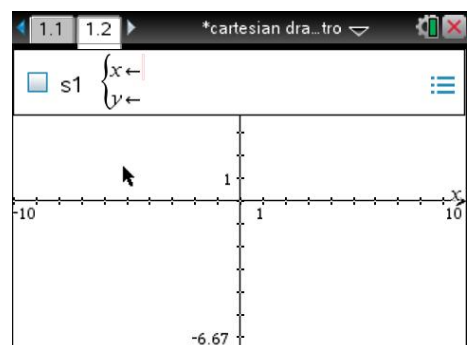
Select the Graph Entry/Edit type.



You need to select Scatter Plot.



Now this Graph entry method should be displayed. (S1 = Scatter Plot 1)



Let x be $x1$ and y be $y1$, the variables we defined in the Lists & Spreadsheet application.

Your points will be displayed.

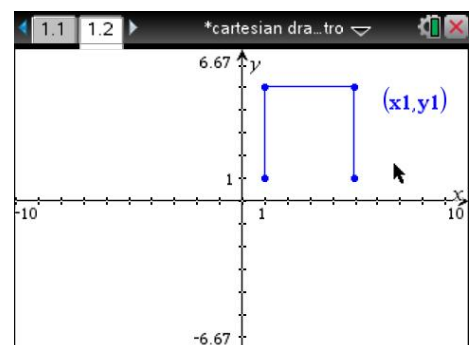
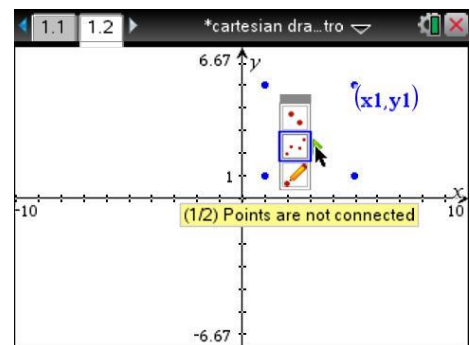
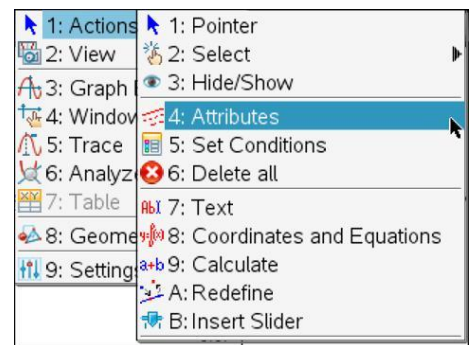
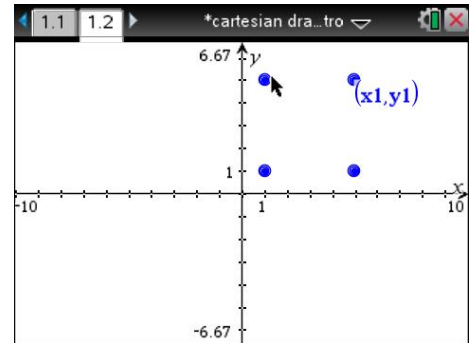
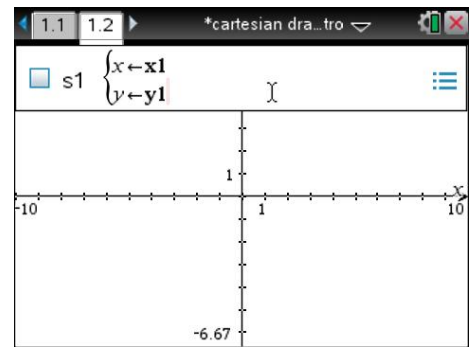
Next we have to join them up, press:

menu > **Actions** > **Attributes**

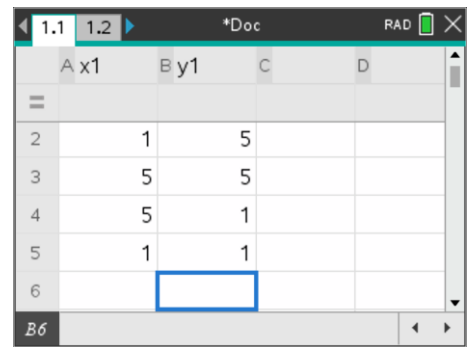
Click on one of the points.

Select the middle attribute and change it to: "Points are Connected".

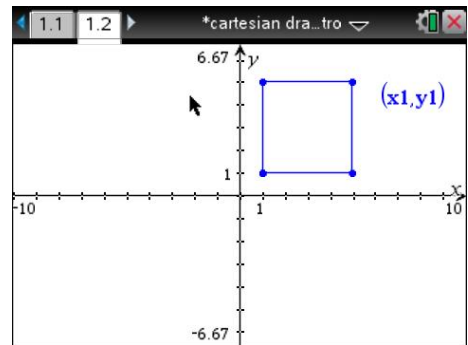
You will notice now the shape is not completed.



In order to join the shape up, the initial point must be added to the end of your points list.



Your shape should be complete.



Drawing a Bat on your Calculator

Now try this set of data:

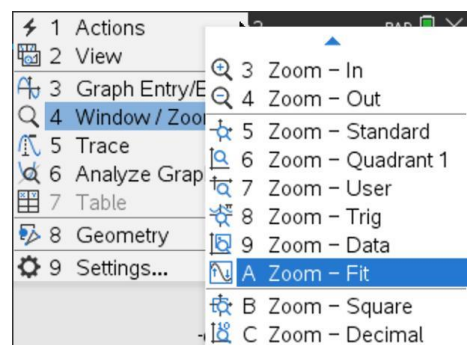
X ₁	7	8	9.5	11	13	10.5	8.5	7.5	5	3.5	2.5
Y ₁	6	5	4	3.5	3	2.5	1.5	0.5	0.5	0	-1
X ₁	2	1	-1	-2.5	-4	-5	-7	-9	-8.5	-9.5	-12
Y ₁	-2	-1.5	-1	-1.5	-2.5	0	1.5	1.5	4	5.5	6
X ₁	-13	-14	-11	-9	-8	-7	-5.5	-4	-2.5	-2.5	-1.5
Y ₁	9	10.5	10.5	10.5	11	8	5.5	4	6	5	5
X ₁	-0.5	0	-0.5	0	1	3	5	7			
Y ₁	4.5	5	4.5	2.5	3	4	5	6			

You may notice your image goes outside of the calculator window. You can change the window settings to ensure that all the data you entered will fit. Press:

menu > **Window/Zoom** > **Zoom - Fit**.

All your points should be visible now.

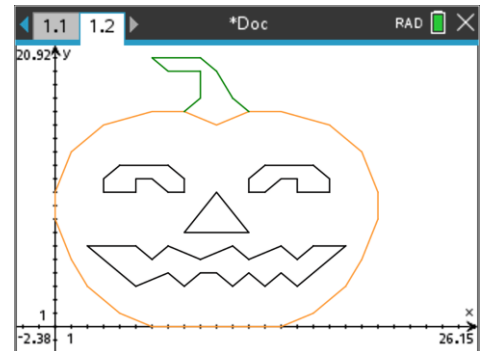
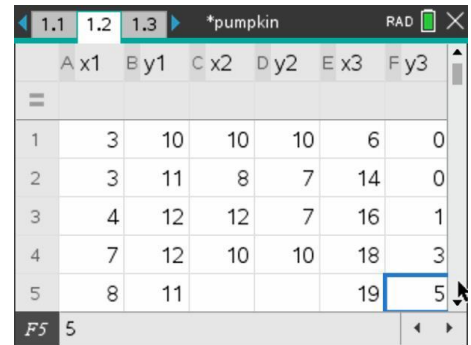
Note that the window is no longer 'square', it has been stretched to fit.



Multiple Shapes:

Multiple sets of data can be graphed. Label extra columns as: x2, y2 etcetera and graph them on the same axes accordingly.

The pumpkin or Jack-O-Lantern is constructed using six sets of points.



Pumpkin coordinates

X ₁	3	3	4	7	8	8	7	6	5	5	3
Y ₁	10	11	12	12	11	10	10	11	11	10	10
X ₂	10	8	12	10							
Y ₂	10	7	7	10							
X ₃	6	14	16	18	19	20	20	19	17	14	12
Y ₃	0	0	1	3	5	8	10	13	15	16	16
X ₃	10	8	6	3	1	0	0	1	2	4	6
Y ₃	15	16	16	15	13	10	8	5	3	1	0
X ₄	2	5	6	7	9	11	12	14	15	16	18
Y ₄	6	6	5	6	5	6	5	6	5	6	6
X ₄	15	14	13	12	11	10	9	8	7	5	2
Y ₄	3	4	3	4	3	4	4	3	4	3	6
X ₅	12	13	14	15	15	17	17	16	13	12	12
Y ₅	10	10	11	11	10	10	11	12	12	11	10
X ₆	8	9	9	7	6	9	10	11	12		
Y ₆	16	17	19	19	20	20	19	17	16		

Changing the Colours

Encourage students to be creative and systematic in their drawings.

There are 3 tns files which accompany the Activity. They show the completed images with data tables

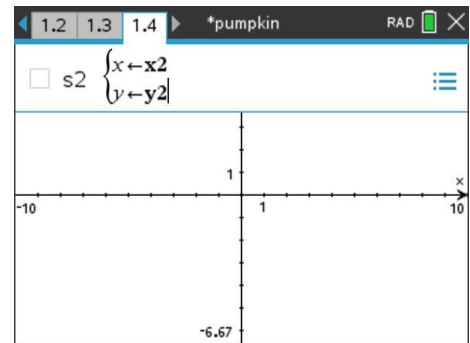
Halloween cartesian drawing into square.tns

Halloween bat.tns

Halloween pumpkin.tns

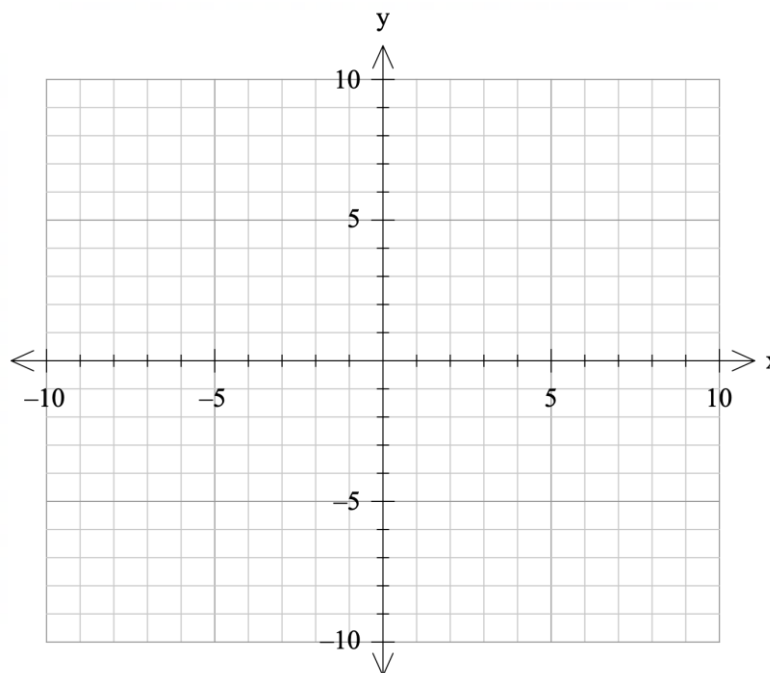
If you wish to shorten the activity you can delete the graphing page providing the students with just the raw coordinate data for them to manipulate.

Remember to graph each set of coordinates as a different scatter plot.
The pumpkin uses six scatter graph plots.



Drawing your own Picture

The possibilities are endless. I recommend taking time planning your drawing on graph paper with pencil and ruler. Existing Cartesian coordinate pictures can be converted to a digital version. Sketch your image on the grid.



Now write down the coordinates in order that you will need to construct your own image.

x1	y1	x2	y2	x3	y3	x4	y4	x5	y5	x6	y6	x7	y7
