

Creating a Mathematical Modelling Activity

A guide by Thomas Yeo, thomas.yeo@ti.com

Objectives:

- Create an activity (tns file) that teachers can send to students using TI-Nspire CX Navigator System or TI-Nspire CX Docking Station
- Students make a prediction using a given image/diagram/illustration
- Students are to collect data using the created activity, and use it for analysis
- Students then make meaning of the acquired equation and apply it in problem solving

End Result:



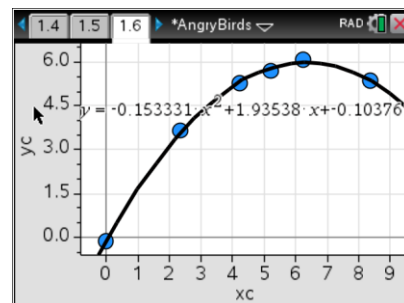
Data capture page:

Students perform data capture on a real world problem.

	A xc	B yc	C	D
	=capture(')	=capture(')		
1	-2.66454...	-0.125786		
2	2.32704	3.6478		
3				
4				
5				

Lists & Spreadsheet:

Data captured is automatically stored here.



Data & Statistics:

Students perform regression to analyse the data collected.

Guiding questions:

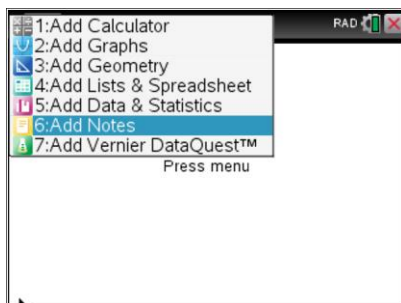
Teachers can include guiding questions to facilitate student discussions in the activity.

Part 1: Setting up the image and questions

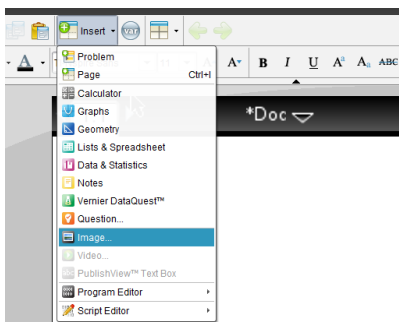
In the first section, we set up an introductory section for students to make observations, discuss and predict the model. In any modelling activity, it is important to set the real world context so that the activity is authentic and allows students to make meaning of what they learnt in class.

The image used here is a screen capture from the smartphone game Angry Birds. Teachers can use any image relevant to what topic or real world problem/phenomenon they wish to address in the activity.

You may also wish to add any Notes page to give instructions, include some Math concepts/notes, etc.



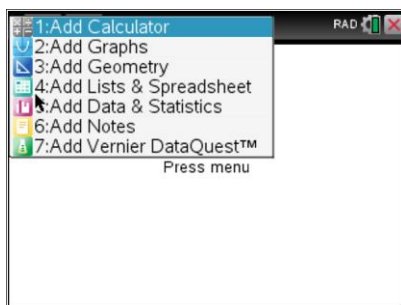
Start a new **Document** and add a **Notes** page.



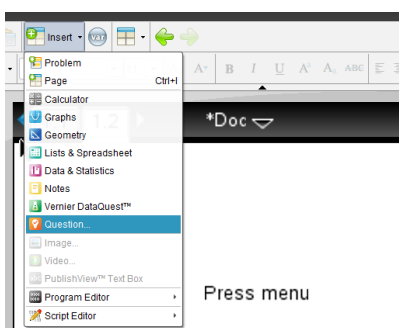
Click on **Insert** and select **Image**.



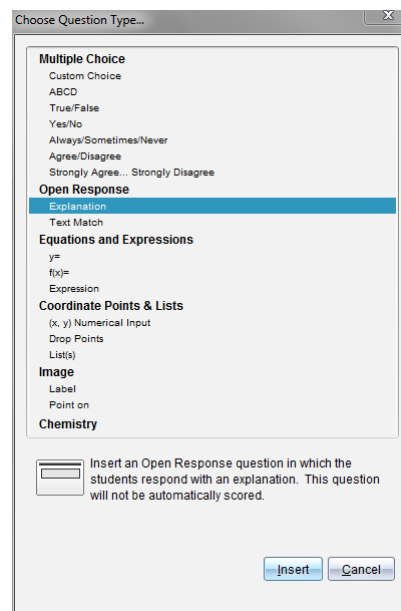
Upon selecting the image file from your computer, you will see the image in the **Notes** page.



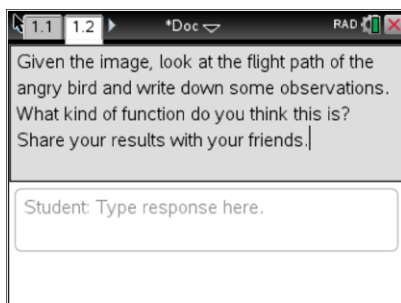
Add a new page by pressing **ctrl** **doc**. Do not select any of the apps.



Click on **Insert** and select **Question**. *Note that this is only available on Teacher software.*



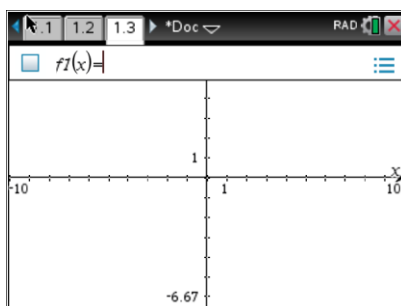
Select **Explanation** and click on **Insert**.



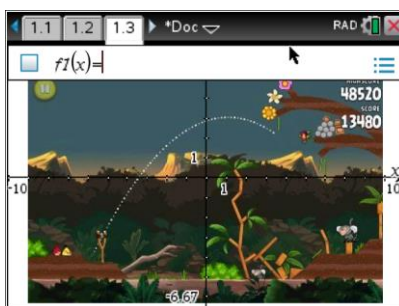
Type in your question accordingly.
You may wish to add more questions if necessary.

Part 2: Setting up the data capture

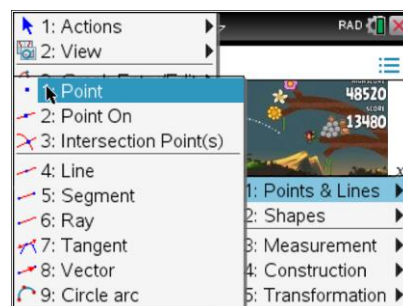
In the second part, we set up the data capture activity itself.



Insert a new page by pressing **ctrl** **doc**. Select a **Graphs** page.



Insert the image as in Part 1.



Insert a point anywhere on the screen (except axes) by pressing **menu**, then select **Geometry**, then **Points & Lines** then **Point**. Click anywhere to place the point.



Right click on the point to change the colour (select **Color** then **Line Color**).



Choose a colour that contrasts with your background image.



You may wish to change how the point looks. It is recommended to select a larger one so that it is easier for students to manipulate it on the handhelds. Right click then select **Attributes**. Choose accordingly.



You should also re-position the origin according to your needs.



To show the coordinates of the point, right click on it then select **Coordinates and Equations**.



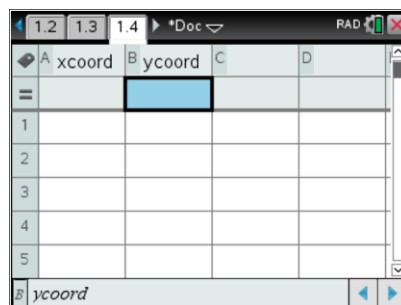
Re-position the coordinates by dragging it to another location such that it does not obstruct the view.



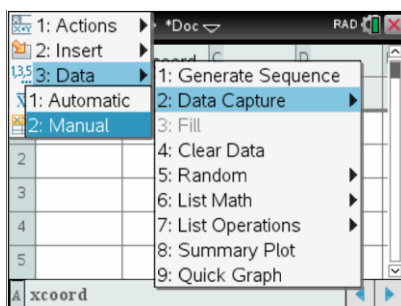
Click on the x-coordinate and press **var**. Select **Store Var**.



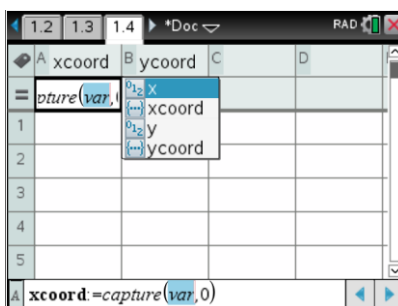
Type x and press **Enter**. Repeat this for y-coordinate and name it as y.



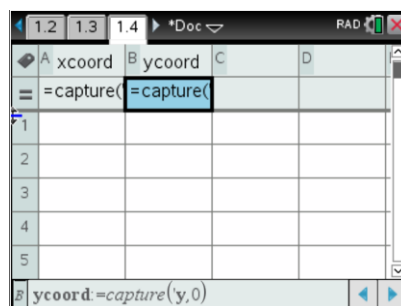
Insert a new **Lists & Spreadsheet** page. Name column A as xcoord and column B as ycoord. This page will be used to automatically store captured data.



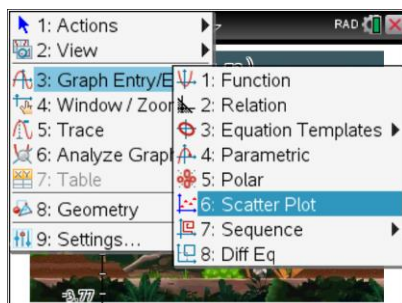
Click on the formula box for column A and press **menu**. Select **Data**, then **Data Capture**, then **Manual**.



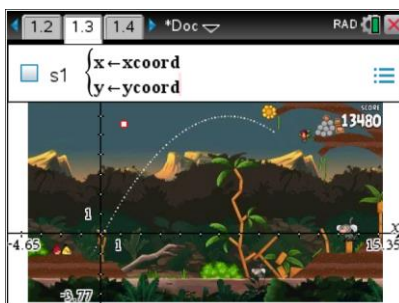
Press **var** and select x. Repeat the same for column B and select y.



This is the completed set up for the spreadsheet.



Go back to the Graphs page and press **menu**. Select **Graph Entry** then **Scatter Plot**.



Enter xcoord for x and ycoord for y. Press **Enter**.

Do remember to save the file when completed. This tns file can be sent to students to be used in class.

Part 3: Using the tns file created

In the last part of the notes, a brief description of how to use the activity file is given.



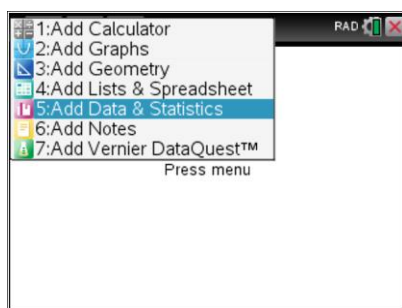
To capture a point, move the created point to the desired location, then press **ctrl** **.**. Repeat to capture more points.



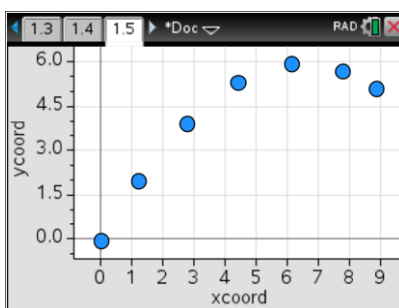
This is an example of how it looks like after students captured all the points required.

	A	B	C	D
	xcoord	ycoord		
=	capture(=capture(
1	0.062893	-0.0628...		
2	1.25786	1.94969		
3	2.83019	3.89937		
4	4.46541	5.28302		
5	6.16352	5.91195		
	ycoord = capture(y,0)			

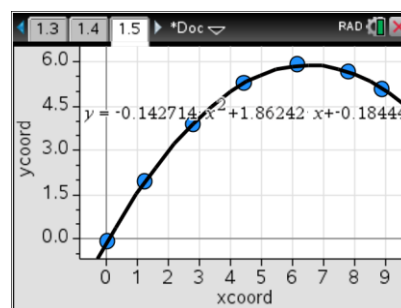
On the Lists & Spreadsheets page, the coordinates of the all the points will be automatically stored here.



Instruct students to create a new Data & Statistics page.



Set the axes accordingly by clicking on the axes and selecting the appropriate variables.



Perform regression by going to **menu**, then **Analyse**, then **Regression** and the appropriate regression. In the lesson, allow students to experiment different regressions and discuss before sharing their findings.