

Fathom Instructions

Canada's Youth Cohorts Sinusoidal Activity



Background Information

A graph of data based on human activities rarely approximates the shape of a sine curve with any accuracy. However, occasionally the underlying conditions lead to trends that closely follow a sinusoidal curve. The Baby Boom occurred after World War II, when Canadian soldiers returned and started having children in record numbers. As such, there was a great increase in the number of births beginning in 1946, the first year after World War II ended. Births increased for several years and then began to decline. As a result of the Baby Boom, distributions of certain age cohorts in Canada closely approximate a sine curve.

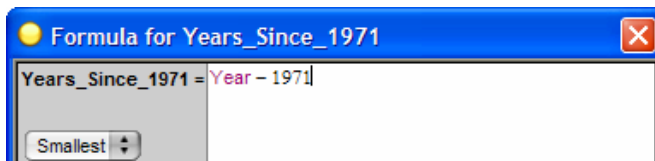
Fathom Analysis

Note: These instructions were written for Fathom 2. If you are using Fathom 1, some instructions may be slightly different.

Retrieving, copying, and pasting the data

- 1) On the **E-STAT Output specification** page, under **Screen output – table:**, select **Plain text: Table, time as rows**.
- 2) Click on the **Retrieve now** button.
- 3) Highlight only the data, but not the attribute names, legend at the top of the page, or the source line at the bottom of the page
- 4) Right-click and select **Copy**.
- 5) Switch to **Fathom**. If Fathom isn't already running, you will need to launch it.
- 6) Create a new collection by dragging and dropping the **Collection** icon onto the workspace.
- 7) Double-click on the pre-assigned collection name to rename it **Youth Cohorts**.
- 8) Right-click on the collection and select **Paste Cases**.
- 9) Double-click on the collection to inspect it.
- 10) Double-click on the pre-assigned attribute names to rename them **Year** and **Pop_20_24**.
- 11) Click on the attribute labelled **<new>** and rename it **Years_Since_1971**.
- 12) Right-click on this attribute name and select **Edit Formula**.
- 13) Click on the **+ sign** beside the word **Attributes**. This shows all the attributes available. Double-click on **Year** so it appears in the display window (Note that Fathom turns the word Year purple because it recognizes it as an attribute name). Then, type **- 1971**.
This creates a new attribute that is the number of years since 1971 (the first year for which we retrieve data).

Your screen should look like this:



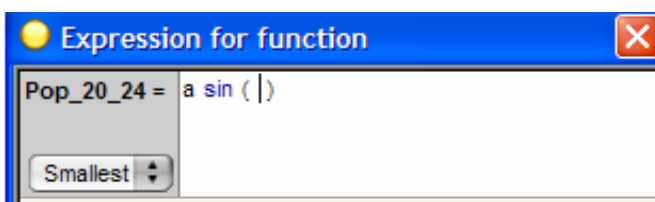
- 14) Click on the **OK** button.

- 15) Save your Fathom collection as **Youth Cohorts**.

Graphing and modelling the data

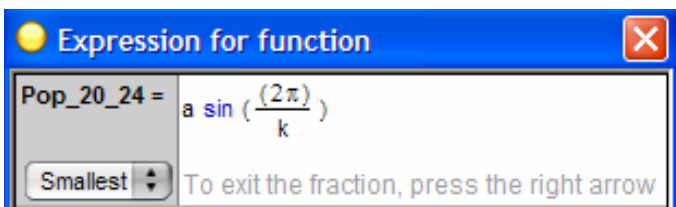
- 1) Create a new graph by dragging and dropping the **Graph** icon onto the workspace.
- 2) Create a scatter plot of the youth population aged 20 to 24 by dragging and dropping the attribute **Years_Since_1971** on the **x-axis** and the attribute **Pop_20_24** on the **y-axis**.
- 3) Create four new sliders by dragging and dropping the **Slider** icon onto the workspace four times.
- 4) Rename slider **V1** as **a**, slider **V2** as **k**, slider **V3** as **d**, and slider **V4** as **c** by double-clicking on the pre-assigned slider names.
- 5) **Right-click** on the graph and select **Plot Function**. A pop-up window 'Expression for Function' will appear.
- 6) Type the letter **a** and then click on the **x button (multiplication sign)**.
- 7) Click on the **+ sign** beside **Functions** to extend the list. Then, click on the **+ sign** beside **Trigonometric** to extend that list. Now, **double-click** on **sin**.

Your screen should look like this:



- 8) Inside the brackets, click on the **() button** again. In these inner brackets, type the number **2** and then click on the **+ sign** beside **Special** to extend the list. **Double-click** on **pi**. Now, click to the right of the inner brackets (still inside the outer brackets) and then click on the **÷ button (division sign)** and then type the letter **k**.

Your screen should look like this:

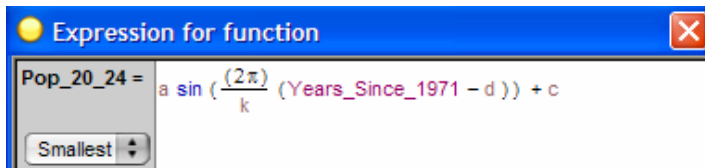


Note: It is necessary to use $\frac{2\pi}{k}$ instead of just k in this equation because the variable on the x-axis is measured in non-angle units (the number of years since 1971) as opposed to angle units (radians).

- 9) Click to the right of the $\frac{2\pi}{k}$ fraction (still inside the outer brackets) and click on the **() button** again. Click on the **+ sign** beside **Attributes** to extend the list. **Double-click** on

Years_Since_1971. Then, type **- d**. Finally, click to the right of all the brackets and type **+ c**.

Your screen should look like this:



- 10) Click on the **OK button**.
- 11) Using your knowledge of sinusoidal functions and the meaning of the parameters **a**, **k**, **d**, and **c**, change the sliders to values that will closely approximate the youth cohort data.
Note: You can change the upper and lower bounds of the slider by double-clicking on the values and then editing the **Upper_** and **Lower_** in the pop-up table. You can also manually drag the values on the slider by placing your mouse over the values until a **sideways hand** appears. Drag this hand in order to alter the range of values.

******* Go to your worksheet and answer questions #1 to 8. Question #8 requires that you paste your graph into your worksheet. To do this, click on the graph, then go to the Edit menu, and select Copy As Picture. When you are in the worksheet document, right-click and paste your graph. *******