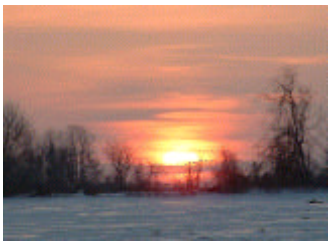
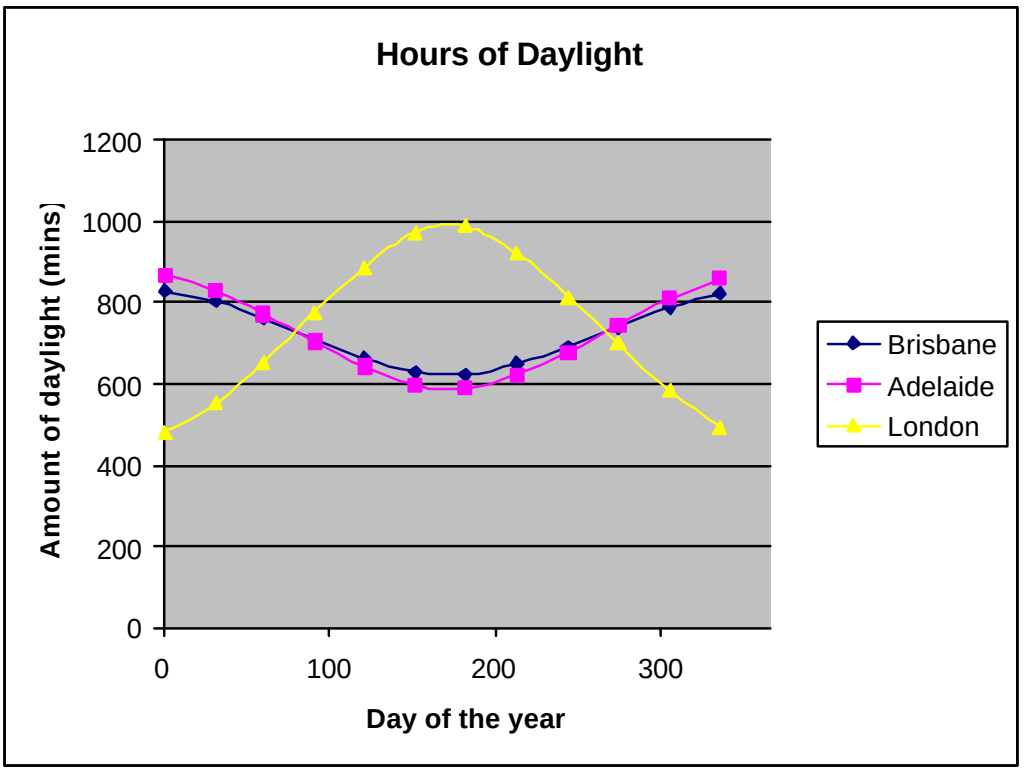
Sunrise & Sunset Times



At any place on the earth, the amount of daylight varies during the year.

The table below shows the amount of daylight in minutes on several days spread throughout the year, for Brisbane, Adelaide and London.

	Amount of Daylight (in minutes)		
Date	Brisbane	Adelaide	London
01-Jan	831	868	481
01-Feb	803	829	553
01-Mar	761	772	655
01-Apr	710	704	776
01-May	664	643	886
01-Jun	631	598	973
01-Jul	625	590	988
01-Aug	649	623	922
01-Sep	692	680	814
01-Oct	740	745	700
01-Nov	789	810	584
01-Dec	824	859	496



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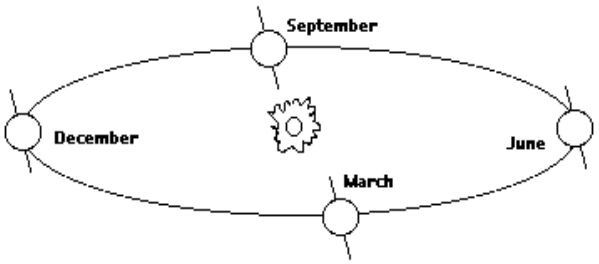
Assignment

Your assignment is to find and evaluate functions to model the data given on the Data Sheet.

For each place, use a trigonometric function to model how the amount of daylight varies with the day of the year.

- Briefly explain the reason for the choice of a trigonometric function.
- Explain how you chose the parameters of your functions and how your functions are related to basic functions of their type.
- Do the functions for different places have the same period of 365 days?
- How does latitude effect the amplitude of the function?
- At what days during the year, do all places on earth have the same amount of daylight (equinox)? Do your functions suggest that this amount is 12 hours (720 minutes)? Why might you expect a value slightly larger than 720 minutes? (equinox details are given at http://www-spof.gsfc.nasa.gov/stargaze/Sseason.htm)



Plot graphs to compare the given data with values given by your models.
(At least one of your graphs should be drawn using a graphic calculator or computer software.)

Consider how errors or inaccuracies in the given data may affect your models and explain how, in general terms, the functions you found could be different.

Extension –
You could find data for a place of your choice to model hours of daylight or

Here is a trigonometric function with a period of 365 days and a phase shift of 266 days for Brisbane:

$$y = 104\sin\left[\frac{2\pi}{365}(x-266)\right]+726$$

Does this equation model the data better then the equation you produced?