7 Chapter Task

Time to Bloom

The flowering of many commercially grown plants in greenhouses depends on the duration of natural darkness and daylight. Short-day plants, such as chrysanthemums, need 12 or more hours of darkness before they will start to bloom. Long-day plants, such as carnations, need more than 12 h of daylight.

The number of hours of daylight, $h(t)$, varies with the latitude and the time of the year, t, where t is the day of the year.

		Hours of Daylight on the Middle Day of Each Month		
Month	**Day of the Year**	**Ottawa, ON (45° N Lat.)**	**Regina, SK (50° N Lat.)**	**Whitehorse, YT (60° N Lat.)**
January	15	8.9	8.5	6.6
February	45	10.1	10.1	9.2
March	75	11.6	11.8	11.7
April	106	13.3	13.7	14.5
May	136	14.7	17.1	22.2
June	167	15.4	16.4	18.8
July	197	15.1	15.6	17.5
August	228	13.8	14.6	15.8
September	259	12.2	12.7	13.8
October	289	10.7	10.8	10.2
November	320	9.3	9.1	7.6
December	350	8.6	8.1	5.9

When will carnations begin to bloom in greenhouses in these parts of Canada?

A. Use the data in the table to estimate when carnations will start to bloom in Ottawa, Regina, and Whitehorse.

B. Plot the data for Regina on a scatter plot, and draw a curve of best fit. Use your graph to determine the amplitude, period, and equation of the horizontal axis.

C. Use your estimate in part A to create an algebraic model for the Regina data. Use sinusoidal regression on a graphing calculator to check your results.

D. Repeat parts B and C for the Ottawa and Whitehorse data.

E. Use the algebraic models you found to calculate
- **a)** when the hours of daylight first exceed 12 h
- **b)** the interval in the year when there are more than 12 h of daylight

F. Show your results for part E on the graphs you created for the three cities.

G. Write a report to compare the blooming season for carnations in the three cities. Include the graphs you created in your report.

Task *Checklist*

- ✔ Did you show all your steps?
- ✔ Did you draw and label your graphs accurately?
- ✔ Did you support your choice of model?
- ✔ Did you explain your thinking clearly?