

# Questions

## Changing Temperature

### [Chilliwack Climate](#)

The following table shows weather by month and temperature/precipitation averages in Chilliwack, BC:

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	1.7	3.8	6.6	9.5	12.9	15.5	17.8	17.7	15	10.4	5.9	2.8
Min. Temperature (°C)	-1	0.4	2.4	4.7	7.7	10.4	11.8	11.7	9.5	6.2	2.9	0.2
Max. Temperature (°C)	4.5	7.3	10.8	14.4	18.1	20.6	23.8	23.7	20.5	14.7	8.9	5.5
Avg. Temperature (°F)	35.1	38.8	43.9	49.1	55.2	59.9	64.0	63.9	59.0	50.7	42.6	37.0
Min. Temperature (°F)	30.2	32.7	36.3	40.5	45.9	50.7	53.2	53.1	49.1	43.2	37.2	32.4
Max. Temperature (°F)	40.1	45.1	51.4	57.9	64.6	69.1	74.8	74.7	68.9	58.5	48.0	41.9
Precipitation / Rainfall (mm)	215	165	147	118	95	78	54	55	97	168	221	227

For thousands of years, First Nations peoples have gathered information about the area they live in so that they know the best times, places, and ways to grow, tend and harvest their nutrient-rich foods.

Berry patches are tended and protected so important nutrients (that we now call antioxidants, vitamin C, etc.) are available to the whole community, ensuring community health.

You are part of a small group of young people being apprenticed by the women who carry the knowledge of where the berries and other important foods grow, how to tend the patches so they continue to produce crops that can feed the whole community, and the ways to best harvest them.

You learn that berries start ripening when the temperature is comfortable when no extra layer of clothing is required to keep you warm. Create two trigonometric models, one for average temperature and one for rainfall. Use these models to determine a range of dates that might be best for berry-gathering. Include any assumptions you have made.

Possible Extensions: Develop another sinusoidal function to best approximate the optimal times in a day for berry-gathering. Use the data from [Time and Date](#). Justify your solution with more than one method.

## Tidal Waves

### Tide Times for Deep Cove

The following is a table that shows high tide and low tide on Friday, March 8 and Saturday, March 9 in Deep Cove:

DEEP COVE TIDE TABLE:

Friday 8 March	6:39 AM	PST			Sunrise
	<b>7:36 AM</b>	PST	4.41 m	(14.46 feet)	<b>High Tide</b>
	7:54 AM	PST			Moonrise
	<b>1:10 PM</b>	PST	2.34 m	(7.67 feet)	<b>Low Tide</b>
	6:05 PM	PST			Sunset
	<b>7:29 PM</b>	PST	4.08 m	(13.39 feet)	<b>High Tide</b>
	8:20 PM	PST			Moonset
Saturday 9 March	<b>1:12 AM</b>	PST	1.95 m	(6.39 feet)	<b>Low Tide</b>
	6:38 AM	PST			Sunrise
	<b>7:55 AM</b>	PST	4.35 m	(14.26 feet)	<b>High Tide</b>
	8:15 AM	PST			Moonrise
	<b>1:45 PM</b>	PST	2.13 m	(6.99 feet)	<b>Low Tide</b>
	6:07 PM	PST			Sunset
	<b>8:15 PM</b>	PST	4.06 m	(13.33 feet)	<b>High Tide</b>
	9:26 PM	PST			Moonset

You are paddling a canoe from Deep Cove to Say Nuth Khaw Yum Provincial park near the end of Indian Arm. When the tide is falling, the current in the Arm is extremely challenging to paddle. Use the data to create a trigonometric model and estimate the best time to leave on this journey. The distance for this trip is about 15 km, and canoes can travel about 5 km/h.

Say Nuth Khaw Yum means “Serpent’s Land.” It is in the core of Tsleil-Waututh traditional territory that has, from time immemorial, been an area of significance to the Tsleil-Waututh people. For over a millennium, the Tsleil-Waututh Nation has continued to use the land, water, and resources of the entire Indian Arm.

### Possible Extensions

According to the provided data, provide another sinusoidal function to approximate the worst time to travel from Deep Cove to Say Nuth Khaw Yum Provincial Park. Justify your solution with more than one method.

- Suppose you want to stay at the Park for three hours before returning to Deep Cove. Is this feasible with the currents? Why or why not?

## **Sound Travel**

### [Understanding Sound Waves](#)

Sound is a compression wave propagating through a medium made of atoms and molecules. Frequency is the number of cycles a molecule travels per second, measured in hertz (Hz). Frequency is inversely related to the period which is the time it takes for one cycle of the wave to pass. The frequency of sound is commonly known as pitch. The faster the wave of moving molecules, the higher the frequency, consequently, the higher the pitch.

The loudness of the sound is defined by the distance a molecule shifts from the equilibrium due to the amount of energy transfer. This displacement of the molecule leads to sound pressure in the air. This displacement of a molecule is measured in decibels (dB). The greater the energy transfer, the greater the displacement of the molecule from equilibrium, and the louder the sound is.

Watch the YouTube clip on [Understanding Sound Waves](#), determine the sinusoidal functions that represent the normal hearing range of a person.

### **Possible Extensions**

Compare and contrast the sinusoidal functions that represent the hearing ranges of a beluga whale and a bat. How do these animals' hearing range compare to the humans' hearing range? Why do you suppose that is? What are some of the implications of different mammals' hearing ranges?