

## L8 – 5.4 Applications of Trigonometric Equations

MHF4U

### Part 1: Application Questions

**Example 1:** Today, the high tide in Matthews Cove, New Brunswick, is at midnight. The water level at high tide is 7.5 m. The depth,  $d$  meters, of the water in the cove at time  $t$  hours is modelled by the equation

$$d(t) = 3.5 \cos\left(\frac{\pi}{6}t\right) + 4$$

Jenny is planning a day trip to the cove tomorrow, but the water needs to be at least 2 m deep for her to maneuver her sailboat safely. Determine the best time when it will be safe for her to sail into Matthews Cove?

**Example 2:** A city's daily temperature, in degrees Celsius, can be modelled by the function

$$t(d) = -28 \cos\left(\frac{2\pi}{365}d\right) + 10$$

where  $d$  is the day of the year and 1 = January 1. On days where the temperature is approximately  $32^{\circ}\text{C}$  or above, the air conditioners at city hall are turned on. During what days of the year are the air conditioners running at city hall?

**Example 3:** A Ferris wheel with a 20 meter diameter turns once every minute. Riders must climb up 1 meter to get on the ride.

**a)** Write a cosine equation to model the height of the rider,  $h$  meters,  $t$  seconds after the ride has begun. Assume they start at the min height.

**b)** What will be the first 2 times that the rider is at a height of 5 meters?