6. [9 points] The average high temperature in Anchorage, Alaska increases from a low of 15 degrees Fahrenheit at the beginning of the 6th week of the year to a high of 61 degrees Fahrenheit at the beginning of the 32nd week. For your reference, there are 52 weeks in a year. Suppose the average high temperature in Anchorage w weeks after the beginning of the first week of the year can be modeled by a sinusoidal function $T(w)$.

a. [4 points] Find the period, amplitude and midline of the function $T(w)$.

The period is 52.

The amplitude is 23.

The midline is $T = 38$ or $y = 38$.

b. [5 points] Give a possible formula for $T(w)$. Leave all constants in exact form.

$T(w) =$ $-23\cos\left(\frac{\pi}{26}(w-5)\right)+38$.

Solution: We know the amplitude, period and midline from part (a) so all we need is the horizontal shift to write the function completely. Since the low point is at the point $(5, 15)$, we can use cosine with a horizontal shift of 5 to the right and with a minus sign in front of the amplitude.