Homework 7.11: Tidal Wave Problem Task

Unit 7

Math 3

1. The average temperature for the Ottawa region is hottest at 25°C on July 23, and coolest at 4°C on January 12.

   a) Write a cosine equation for the graph.

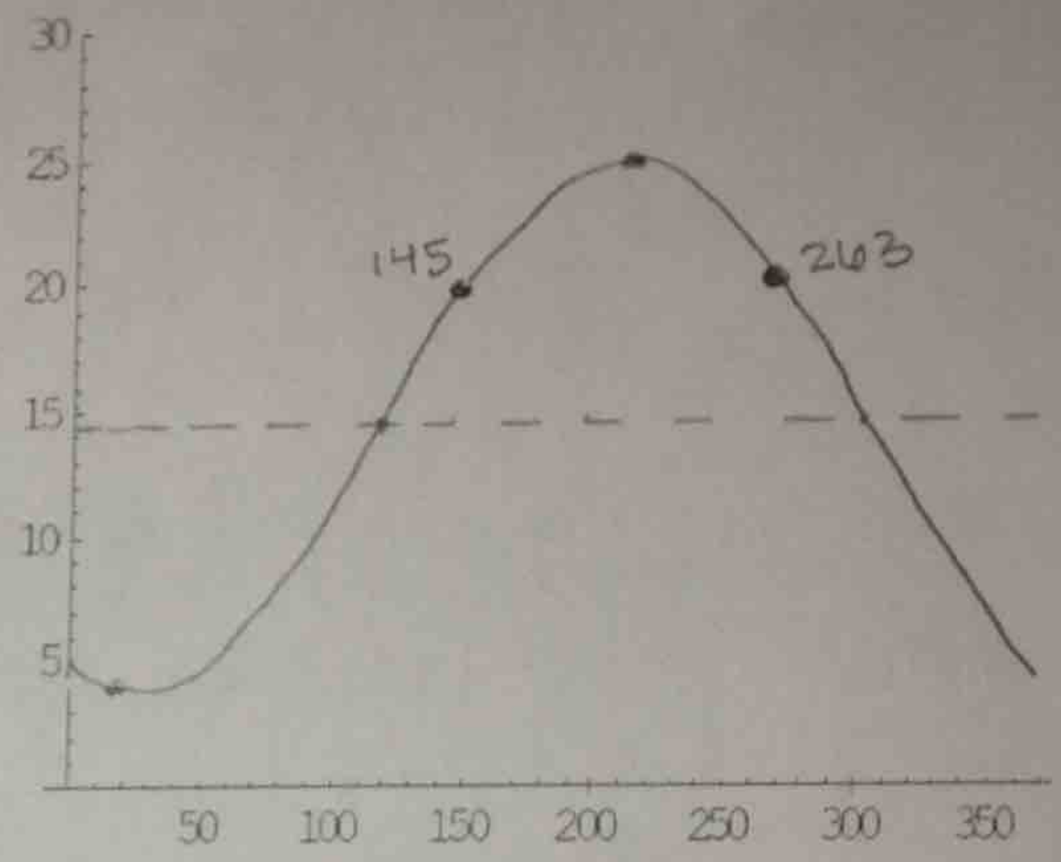
$a = \frac{25-4}{2} = 10.5$

$mid = \frac{25+4}{2} = 14.5$

$h = 204$ (July 23)

$b = \frac{2\pi}{365}$

$y = 10.5\cos\frac{2\pi}{365}(\theta - 204) + 14.5$



   b) Draw the graph that approximates the temperature curve for the year.

   c) What is the average temperature expected for August 4?

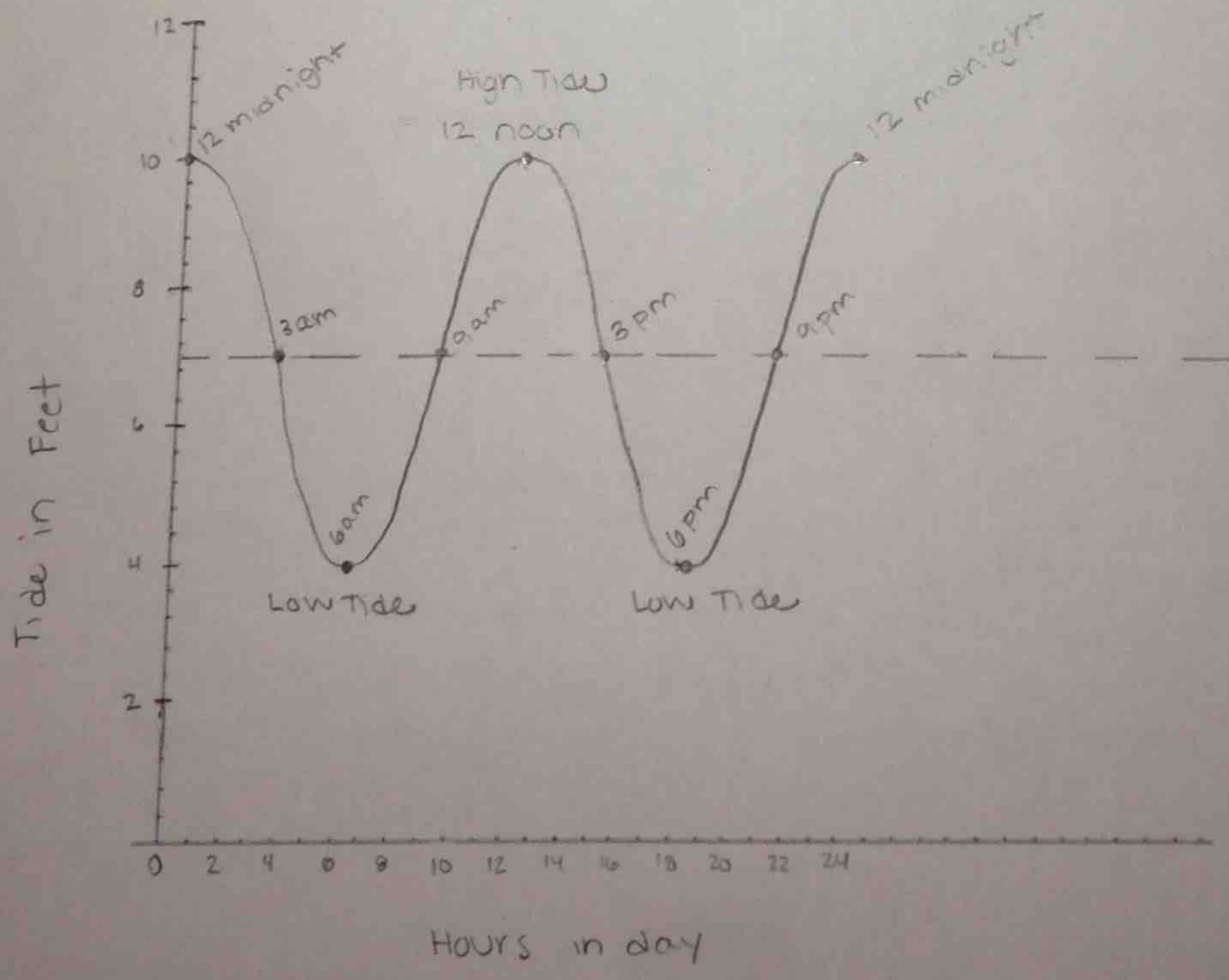
$x = 216$ $y = 24.8°C$

   d) The average temperature is higher than 20°C for how many days?

$263 - 145 = 118$ days

Tidal Wave Graph

Problem Task on Back



Problem Task: At midnight, the water at a particular beach is at high tide. At the same time a gauge at the end of a pier reads 10 feet. Low tide is reached at 6 AM when the gauge reads 4ft.

a) Choose which trig function would be the best fit for this model (assuming midnight is t=0). Justify your choice using specific characteristics of trigonometric function graphs.

cosine because it starts high, which is what happens at high tide.

b) Determine the midline, amplitude and frequency using the above tidal information. You must show all computations and explain why you performed each computation.

$\text{midline} = \frac{10+4}{2} = \frac{14}{2} = 7$

$\text{Frequency} = \frac{24\text{ hrs}}{12\text{hrs}} = 2$

$\text{amp} = \frac{10-4}{2} = \frac{6}{2} = 3$

$b = \frac{2\pi}{12} = \frac{\pi}{6}$

period = 12 hours

c) Write a function based on parts one and two to represent the above tidal information.

$Y = 3\cos\frac{\pi}{6}(\theta) + 7$

d) If the times for high and low tides are reversed what (if anything) would change in the equation from part (c)? Justify your conclusion.

There would be a reflection (a would be negative).

$Y = -3\cos\frac{\pi}{6}(\theta) + 7$

e) If you were instructed to let t=0 represent 9pm, would your function in part (a) still be the most convenient choice? Why or why not? If not, convince your teacher what a better choice would be.

9 pm = 21 hours

Sine function would be best because it starts at the midline. At 9 pm, the ocean is between tides, or exactly at the midline.

$Y = 3\sin\frac{\pi}{6}(\theta) + 7$