

## Lesson 9 – Assigned Questions

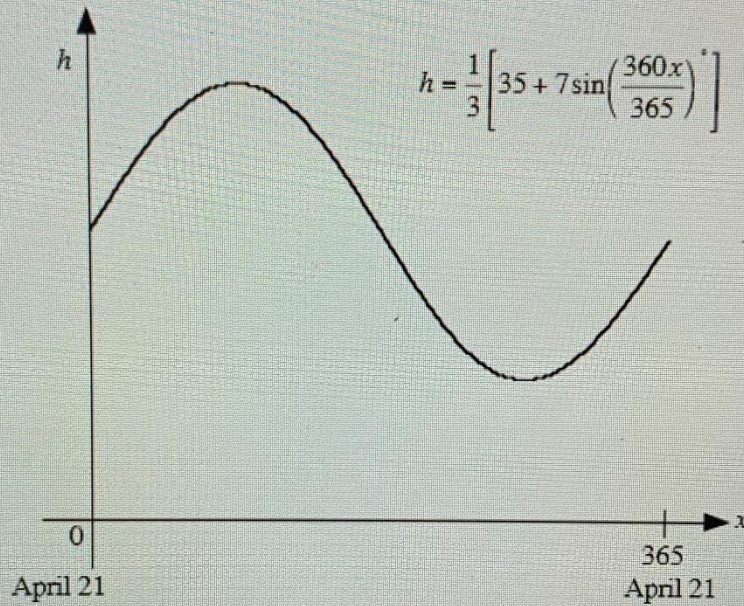
### **Assignment**

1. The alarm in a noisy factory is a siren whose volume,  $V$  decibels, fluctuates so that  $t$  seconds after starting, the volume is given by the function  $V(t) = 18 \sin \frac{\pi}{15}t + 60$ .
- What are the maximum and minimum volumes of the siren?
  - Determine the period of the function.
  - Write a suitable window which can be used to display the graph of the function.
  - After how many seconds, to the nearest tenth, does the volume first reach 70 decibels?
  - The background noise level in the factory is 45 decibels. Between which times, to the nearest tenth of a second, in the first cycle is the alarm siren at a lower level than the background noise?
  - For what percentage, to the nearest per cent, of each cycle is the alarm siren audible over the background factory noise?

3. The height of a tidal wave approaching the face of the cliff on an island is represented by the equation  $h(t) = 7.5 \cos\left(\frac{2\pi}{9.5}t\right)$  where  $h(t)$  is the height, in metres, of the wave above normal sea level  $t$  minutes after the wave strikes the cliff.
- What are the maximum and minimum heights of the wave relative to normal sea level?
  - What is the period of the function?
  - How high, to the nearest tenth of a metre, will the wave be, relative to normal sea level, one minute after striking the cliff?
  - Normal sea level is 6 metres at the base of the cliff.
    - For what values of  $h$  would the sea bed be exposed?
    - How long, to the nearest tenth of a minute, after the wave strikes the cliff does it take for the sea bed to be exposed?
    - For how long, to the nearest tenth of a minute, is the sea bed exposed?

Use the following information to answer the next two questions

The graph below shows how the number of hours ( $h$ ) of daylight in a European city changes during the year.



- Numerical Response** 6. Mid-winter is the day with the least hours of daylight. The number of hours of daylight, to the nearest tenth of an hour, that there will be on mid-winter's day is \_\_\_\_\_.

(Record your answer in the numerical response box from left to right.)

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7. The number of days after April 21 that mid-winter occurs is \_\_\_\_\_.

(Record your answer in the numerical response box from left to right.)

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### Answer Key

1. a) max = 78 dB, min = 42 dB, b) 30 s c) x: [0, 40, 5] y: [30, 100, 10] answers may vary  
d) 2.8 s e) 19.7 s - 25.3 s f) 81%

2. a) 2369 km north b) 3765 km north c) 35.3 minutes

3. a) max = 7.5 m, min = -7.5 m b) 9.5 min c) 5.9 m  
d) i)  $h \leq -6$  ii) 3.8 min iii) 1.9 min

4. a) 12 h b) 7.9 h

5. b) i) After  $t = 18$  move the graph down 0.3 units. If the graph falls below the  $t$  axis, the reservoir will run dry. *or* Draw the line  $y = 0.3$ . If the line intersects the graph, the reservoir will run dry.  
ii) in month 26, i.e. July, 2014

6. 

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