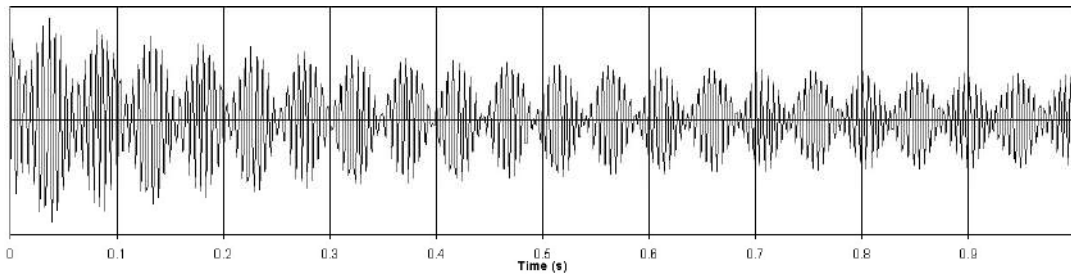


NAME _____

DATE _____



Scenario

Cars A and B are identical. The cars are equipped with horns that sound with the same frequency and emit the same amount of sound energy every second. An experiment is performed in which Car A is at rest 30 meters from Angela, who is holding a microphone. At time $t = 0$, Car B is 10 meters away from the Angela, moving directly away from her at 40 m/s. Both cars have been sounding their horns for enough time that the sound waves have reached Angela before $t = 0$. Angela records data from the microphone for the interval $0 < t < 1$ second while the cars continue to move or stand still and sound their horns. The data taken from the microphone are shown on the graph above.

Argumentation

PART A: The amplitude of the wave detected by Angela varies with time, reaching maximum and minimum values. Explain why this happens by citing appropriate physical principles.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Data Analysis

PART B: Both cars' horns emit a frequency of 200 Hz. Calculate the frequency of Car B's horn as perceived by Angela. Explain how you used the graph to obtain values used as part of your calculation.

PART C: Near the beginning of the interval shown in the above graph, the maxima in sound wave amplitude are larger than the maxima are at the end of the interval shown. Explain why this occurs.

Page 314 has been left intentionally blank