This print-out should have 9 questions. Multiple-choice questions may continue on the next column or page - find all choices before answering.

## Stone in a Mine Shaft 02 <br> $001 \quad 10.0$ points

Carol drops a stone into a mine shaft 121 m deep.

How soon after she drops the stone does she hear it hit the bottom of the shaft? The acceleration of gravity is $9.8 \mathrm{~m} / \mathrm{s}^{2}$ and the speed of sound as $343 \mathrm{~m} / \mathrm{s}$.

## Serway CP 1416

002 (part 1 of 3) $\mathbf{1 0 . 0}$ points
An outside loudspeaker (considered a small source) emits sound waves with a power output of 126 W .

Find the intensity 21.7 m from the source.

003 (part 2 of 3) $\mathbf{1 0 . 0}$ points
Find the intensity level at this distance.

## Answer in decibels.

004 (part 3 of 3) 10.0 points
At what distance would you experience the sound at the threshold of pain, 120 dB ?

## Tipler PSE5 1565

005 (part 1 of 2) $\mathbf{1 0 . 0}$ points
A spherical source radiates sound uniformly in all directions. At a distance of 49 m , the sound intensity level is 33 dB .

At what distance from the source is the intensity level 30 dB ?

What power is radiated by this source?

## Ambulance Siren and Car 01 007 (part 1 of 2) 10.0 points

An ambulance is traveling south at $59.8 \mathrm{~m} / \mathrm{s}$, away from a car that is traveling north at $32.6 \mathrm{~m} / \mathrm{s}$. The ambulance driver hears his siren at a frequency of 1000 Hz .


What wavelength does a person who is standing between the car and the ambulance detect from the sound of the ambulance's siren? The velocity of sound in air is $343 \mathrm{~m} / \mathrm{s}$.

008 (part 2 of 2) $\mathbf{1 0 . 0}$ points
At what frequency does the driver of the car hear the ambulance's siren?

Correct answer: 770.606 Hz .

## Serway CP 1424 <br> $009 \quad 10.0$ points

A bat flying towards a wall at $5.8 \mathrm{~m} / \mathrm{s}$ emits a chirp at 52 kHz .

If this sound pulse is reflected by a wall, what is the frequency of the echo received by the bat? The speed of sound is $341 \mathrm{~m} / \mathrm{s}$.

Correct answer: 53.7995 kHz .

