**Description**
Due Monday Dec. 10,

**1.** Question Details SerCP9 14.P.004. [1589052]

A dolphin located in sea water at a temperature of 25°C emits a sound directed toward the bottom of the ocean 120 m below. How much time passes before it hears an echo?

[ ] s

**2.** Question Details SerCP9 14.P.026. [1658116]

At rest, a car's horn sounds the note A (440 Hz). The horn is sounded while the car is moving down the street. A bicyclist moving in the same direction with one-third the car's speed hears a frequency of 407 Hz.

(a) Is the cyclist ahead of or behind the car?

- ahead
- behind

(b) What is the speed of the car?

[ ] m/s

**3.** Question Details SerCP9 14.P.040. [1658100]

How far, and in what direction, should a cellist move her finger to adjust a string's tone from an out-of-tune 448 Hz to an in-tune 440 Hz? The string is 68.0 cm long, and the finger is 21.6 cm from the nut for the 448-Hz tone. (Indicate the direction with the sign of your answer. Take the direction towards the nut to be positive.)

[ ] cm

**4.** Question Details SerCP9 14.P.050. [1658115]

The overall length of a piccolo is 32.0 cm. The resonating air column vibrates as in a pipe that is open at both ends.

(a) Find the frequency of the lowest note a piccolo can play.

[ ] Hz

(b) Opening holes in the side effectively shortens the length of the resonant column. If the highest note a piccolo can sound is 4,000 Hz, find the distance between adjacent antinodes for this mode of vibration.

[ ] cm

**5.** Question Details SerCP9 10.P.024. [1638327]

The Trans-Alaskan pipeline is 1300 km long, reaching from Prudhoe Bay to the port of Valdez, and is subject to temperatures ranging from -78°C to +32°C.

(a) How much does the steel pipeline expand due to the difference in temperature? (The coefficient of linear expansion of steel is $1.10 \times 10^{-5}°C^{-1}$.)

[ ] km

(b) How can one compensate for this expansion?

**6.** Question Details SerCP9 10.P.034. [1588600]

Gas is contained in a 7.00-L vessel at a temperature of 24.0°C and a pressure of 7.00 atm.

(a) Determine the number of moles of gas in the vessel.

[ ] mol

(b) How many molecules are in the vessel?

[ ] molecules

**7.** Question Details SerCP9 10.P.046.MI.FB. [1639163]

In a period of 1.5 s, $5.0 \times 10^{23}$ nitrogen molecules strike a wall of area 7.0 $cm^2$. If the molecules move at 310 m/s and strike the wall head on in a perfectly elastic collision, find the pressure exerted on the wall. (The mass of one $N_2$ molecule is $4.68 \times 10^{-26}$ kg.)

[ ] Pa

**8.** Question Details SerCP9 10.P.058.soln. [1588727]

Before beginning a long trip on a hot day, a driver inflates an automobile tire to a gauge pressure of 1.79 atm at 300 K. At the end of the trip, the gauge pressure has increased to 2.29 atm.

(a) Assuming the volume has remained constant, what is the temperature of the air inside the tire?

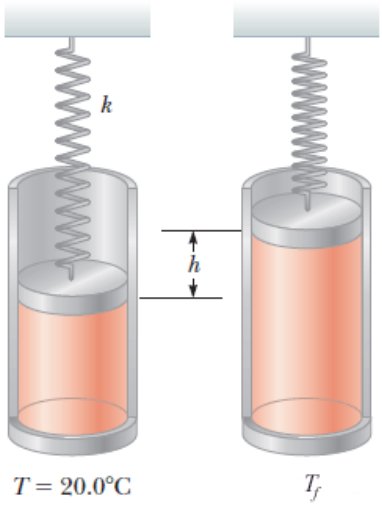
[ ] K

(b) What percentage of the original mass of air in the tire should be released so the pressure returns to its original value? Assume the temperature remains at the value found in part (a) and the volume of the tire remains constant as air is released.

[ ] %

**9.** Question Details SerCP9 10.P.060. [1594457]

An expandable cylinder has its top connected to a spring with force constant $2.00 \times 10^3$ N/m (see figure below). The cylinder is filled with 6.00 L of gas with the spring relaxed at a pressure of 1.00 atm and a temperature of 20.0°C.




(a) If the lid has a cross-sectional area of 0.0100 $m^2$ and negligible mass, how high will the lid rise when the temperature is raised to $T_f$ = 270°C?

[ ] cm

(b) What is the pressure of the gas at $T_f$ = 270°C?

[ ] Pa

**10.** Question Details SerCP9 11.P.020.MI.FB. [1665669]

A 1.50-kg iron horseshoe initially at 610°C is dropped into a bucket containing 25.0 kg of water at 26.0°C. What is the final temperature of the water–horseshoe system? Ignore the heat capacity of the container and assume a negligible amount of water boils away.

[ ] °C

**11.** Question Details SerCP9 11.P.024.soln. [1588642]

An unknown substance has a mass of 0.125 kg and an initial temperature of 93.4°C. The substance is then dropped into a calorimeter made of aluminum containing 0.285 kg of water initially at 21.6°C. The mass of the aluminum container is 0.150 kg, and the temperature of the calorimeter increases to a final equilibrium temperature of 32.0°C. Assuming no thermal energy is transferred to the environment, calculate the specific heat of the unknown substance.

[ ] J/kg · °C

**12.** Question Details SerCP9 11.P.028. [1588689]

How much energy is required to change a 20-g ice cube from ice at −15°C to steam at 105°C?

[ ] J

Assignment Details

Name (AID): **Homework #11**
Submissions Allowed: **5**
Category: **Homework**
Code:
Locked: **No**
Author: **Segre, Phil ( psegre@physics.emory.edu )**
Last Saved:

**Feedback Settings**
Before due date
Question Score
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