First Major (Term 031)

1 Q0 A sinusoidal wave, given by the equation:
17 Q0
Q0 y(x,t) = 0.07 cos(6.0 x – 30 t)
Q0
Q0 where x and y are in meters and t is in seconds, is
Q0 moving in a string of linear density =1.2 g/m
Q0 At what rate is the energy transferred by the wave?
Q0
A1 1.32*10**(-2) W.
A2 1.05*10**(-2) W.
A3 3.02*10**(-2) W.
A4 2.21*10**(-2) W.
A5 No enough information is given to solve this question.
Q0
2 Q0 A sinusoidal wave is given by the equation:
Q0
17 Q0 y(x,t) = 7.0 cos(-k x – w t + Phi).
Q0
Q0 Which of the following statements is true about this wave:
Q0
A1 The wave is moving to the negative x-axis.
A2 The wave is moving to the positive x-axis.
A3 The wave is a standing wave.
A4 The wave is moving with speed k/w.
A5 The wave is moving with speed kw.
Q0
3Q0 A wave in a string, of linear density 0.13 g/m,
17Q0 is given by the equation:
Q0
Q0 y(x,t) = 0.018 sin(3.0 x – 24 t),
Q0
Q0 where x and y are in meters and t is in seconds.
Q0 the tension in the string is:
Q0
A1 8.32*10**(-3) N.
A2 2.43*10**(-5) N.
A3 3.90*10**(-3) N.
A4 3.12*10**(-2) N.
A5 2.34*10**(-4) N.
Q0
4 Q0 Two identical sinusoidal waves, are out of phase with each
17 Q0 other, travel in the same direction. They interfere and
Q0 produce a resultant wave given by the equation:
Q0
Q0 y(x,t)= 8.0*10**(-4) sin(4.0 x - 8.0 t + 1.57 rad),
Q0
Q0 where x and y are in meters and t is in seconds.
Q0 What is the amplitude of the two interfering waves?
Q0
A1 0.5 m.
A2 1.0 m.
A3 2.5 m.
A4 0.2 m.
A5 4.0 m.
Q0
5 Q0 A string has linear density = 5.1 g/m and is under a

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17 Q0 tension of 120 N. If the vibrating length of the string
   Q0 is 60 cm, What is the lowest resonant frequency?
   Q0
   A1   128 Hz.
   A2   158 Hz.
   A3   225 Hz.
   A4   312 Hz.
   A5   Not enough information.
   Q0
1  Q0 A listener hears two sound waves from two loud-speakers that
18 Q0 are in phase. At the listener’s location a phase difference
   Q0 of 450 degrees is detected. What is the path difference
   Q0 if the wavelength of the waves is 4 m.
   Q0
   A1    5 m.
   A2   10 m.
   A3   99 m.
   A4    1 m.
   A5   zero.
   Q0
2  Q0 If an observer’s distance from a point source is doubled,
18 Q0 the sound intensity level will be
   Q0
   A1   decreased by  6 dB.
   A2   increased by  6 dB.
   A3   decreased by 36 dB.
   A4   increased by 36 dB.
   A5   decreased by  4 dB.
   Q0
03 Q0 A bat is moving toward a wall with a velocity of 30 m/s.
18 Q0 The bat is emitting a sound with frequency 40.0 kHz. The
   Q0 frequency of the reflected sound as heard by the bat is:
   Q0 [take the speed of sound in air = 340 m/s]
   Q0
   A1   47.7 kHz.
   A2   33.5 kHz.
   A3   43.9 kHz.
   A4   43.5 kHz.
   A5   40.0 kHz.
   Q0
04 Q0 In an air pipe, closed at one end, the three successive
18 Q0 resonance frequencies are 425 Hz, 595 Hz, and 765 Hz. If
   Q0 the speed of sound in air is 340 m/s, the length of the
   Q0 pipe is:
   Q0
   A1   1.0 m.
   A2   2.0 m.
   A3   0.5 m.
   A4   2.5 m.
   A5   1.5 m.
   Q0
5 Q0 Two waves are given by the equations:
   Q0
 18Q0               y1(x,t) =  5.0 sin( 0.25 x +  75 t)
   Q0               y2(x,t) = 10.0 sin( 0.50 x + 150 t)
   Q0
   Q0 where x and y are in meters and t is in seconds. The
   Q0 intensity ratio of I1/I2 of the two waves is:
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Q0
Q0
A1 1/16.
A2 1/2.
A3 1/4.
A4 4.
A5 1/3.
Q0
1 Q0 A rod is made of two different metals, one piece has
19Q0 length L and thermal conductivity K and the other piece
Q0 has a length 2 L and thermal conductivity 3 K. The rod
Q0 is situated between two heat reservoirs as shown in
Q0 Fig. 1. What is the steady state temperature at the
Q0 interface of the two pieces ?
Q0
A1 333 Kelvin.
A2 60 Kelvin.
A3 35 Kelvin.
A4 68 Kelvin.
A5 0 Kelvin.
Q0
2 Q0 Calculate the amount of energy, in Joules, required to
19 Q0 completely melt 130 g of lead initially at temperature of
Q0 15.0 degrees Celsius. Melting point of lead = 328 degrees
Q0 Celsius, latent heat of fusion of lead = 2.32*10**4 J/kg
Q0 and the specific heat of lead = 128 J/kg/K.
Q0
A1 8.22*10**3.
A2 3.02*10**3.
A3 5.21*10**3.
A4 1.31*10**4.
A5 8.25*10**7.
Q0
03 Q0 Gas within a closed chamber undergoes the cycle shown in
19 Q0 Fig. 2. Calculate the net heat added to the system in a
Q0 complete cycle.
Q0
A1 60 J.
A2 73 J.
A3 31 J.
A4 14 J.
A5 10 J.
Q0
04 Q0 When the temperature of a sphere is raised by
19 Q0 75 degrees Celsius the sphere’s volume increases
Q0 by 6.9*10**(-5) m**3.If the original volume
Q0 is 1.8*10**(-2) m**3, find the coefficient of
Q) linear expansion of the sphere.
Q0
A1 1.7*10**(-5) (Celsius degrees)**(-1).
A2 5.1*10**(-5) (Celsius degrees)**(-1).
A3 3.4*10**(-5) (Celsius degrees)**(-1).
A4 9.0*10**(-5) (Celsius degrees)**(-1).
A5 2.8*10**(-5) (Celsius degrees)**(-1).
Q0
5 Q0 Liquid nitrogen boils at temperature of -196 degrees Celsius
19Q0 when the pressure is one atmosphere. A silver coin of
Q0 mass 1.5*10**(-2) Kg and temperature 25 degrees Celsius

Q0 is dropped into the liquid. What mass of nitrogen boils
Q0 off as the coin cools to – 196 degrees Celsius.
Q0 [Take the specific heat of silver = 235 J/Kg/K and latent heat
Q0 of vaporization for liquid nitrogen is 2.0*10**5 J/Kg.
Q0
A1   3.90 g.
A2   8.10 g.
A3   20.1 g.
A4   89.0 g.
A5   112 g.
Q0
1 Q0 Two moles of nitrogen are in a 3-liter container at a
20Q0 pressure of 5.0*10**6 Pa. Find the average translational
Q0 kinetic energy of a molecule.
Q0
A1 1.9*10**(-20) J.
A2 7.1*10**(-22) J.
A3 3.6*10**(-20) J.
A4 1.1*10**(-23) J.
A5 1.0*10**(-24) J.
Q0
2 Q0 Two moles of helium (monatomic) gas are heated from 100
20 Q0 degrees Celsius to 250 degrees Celsius. How much heat is
Q0 transferred to the gas if the process is done at constant
Q0 pressure?
Q0
A1 6.23 kJ.
A2 2.63 kJ.
A3 3.11 kJ.
A4 1.51 kJ.
A5 8.52 kJ.
Q0
3 Q0 An ideal diatomic gas, initially at a pressure Pi = 1.0 atm
20 Q0 and volume Vi, is allowed to expand isothermally until it's
Q0 volume doubles. The gas is then compressed adiabatically
Q0 until it reaches its original volume. The final pressure of
Q0 the gas will be:
Q0
A1 1.3 atm.
A2 0.5 atm.
A3 2.0 atm.
A4 0.4 atm.
A5 1.7 atm.
Q0
4 Q0 Five moles, of an ideal monatomic gas, expand at constant
20 Q0 pressure of 1.0*10**2 Pascal from a volume of 1.0 m**3 to
Q0 to a volume of 3.0 m**3. What is the change in the internal
Q0 energy of the system?
Q0
A1   300 J.
A2   500 J.
A3   600 J.
A4   100 J.
A5   1000 J.
Q0
Q5 Q0 For an ideal gas, Which of the following statements are CORRECT:
20Q0
Q0

Q0 1. Cp – Cv = R/2.
Q0 2. In an isothermal process, the internal energy of the
Q0 system does not change.
Q0 3. In an adiabatic process, no heat enters or leaves the system.
Q0 4. In a constant volume process, the work done by the system is
Q0 positive.
Q0
A1 2 and 3.
A2 1 and 3.
A3 1, 2 and 4.
A4 2 and 4.
A5 3 and 4.

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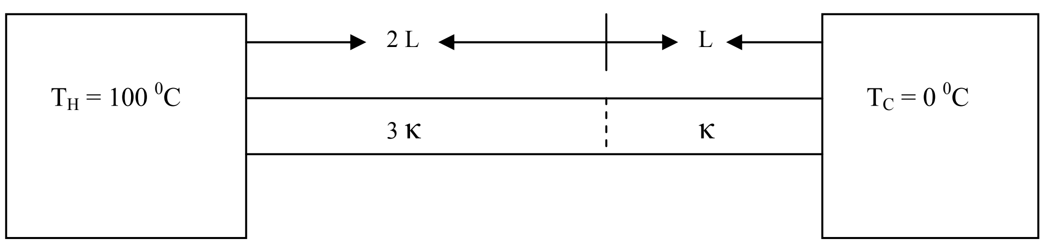

Figure 1

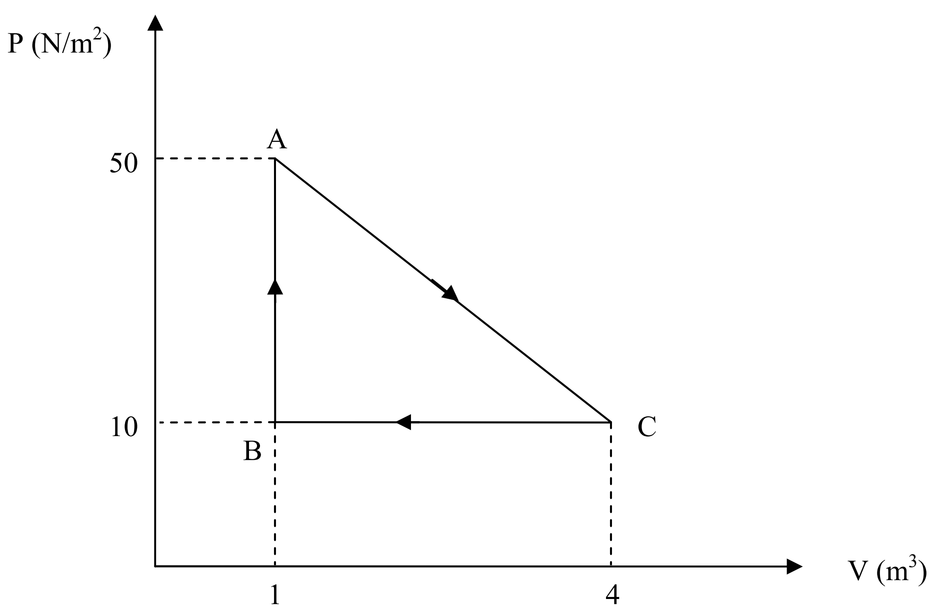

Figure 2