First major (T-012)

Q0 What is the wave speed of a transverse wave on a string
Q0 described by
Q0 $y=(2.0\ \text{mm})\ \sin[10.0\ x-100\ t]$
Q0 where x is in meters and t is seconds.
Q0
A1 10 m/s
A2 1000 m/s
A3 0.010 m/s
A4 20 m/s
A5 2000 m/s
Q0
Q0 A string has a mass density of 0.10 kg/m and it is under
Q0 tension of 10.0 N. What must be the frequency of traveling
Q0 waves of amplitude 10.0 mm for the average power to be 0.5 W?
Q0
A1 16 Hz
A2 100 Hz
A3 0.01 Hz
A4 10 Hz
A5 32 Hz
Q0
Q0 The velocity of a traveling wave on a string under fixed
Q0 tension
Q0
A1 does not change when the frequency increases
A2 increases when the frequency increases
A3 decreases when the frequency increases
A4 decreases when the wave length increases
A5 decreases when the amplitude increases
Q0
Q0 Two identical waves moving in the same direction along a
Q0 stretched string, interfere with each other. The amplitude
Q0 of each wave is 10.0 mm and the phase difference between them
Q0 is 0.80 radian. What is the amplitude of the resultant wave?
Q0
A1 14 mm
A2 10 mm
A3 7.3 mm
A4 20 mm
A5 8.0 mm
Q0
Q0 A standing wave pattern is established on a string as shown in
Q0 Figure 1. The wavelength of the component traveling wave is
Q0
A1 10 m
A2 5.0 m
A3 0.2 m
A4 0.4 m
A5 15 m
Q0
Q0 A string that is stretched between two supports separated by
Q0 1.0 m has resonant frequencies of 500 Hz and 450 Hz, with no
Q0 intermediate resonant frequencies, what is the wave speed in
Q0 the string?
Q0
A1 50 m/s
A2 450 m/s
A3 500 m/s

A4 200 m/s
A5 350 m/s
Q0 Pipe A, which is 1.8 m long and open at both ends, oscillates
Q0 at its third lowest harmonic frequency. Pipe B, which is closed
Q0 at one end, oscillates at its second lowest harmonic frequency.
Q0 The frequencies of pipes A and B match. They are both filled
Q0 with air for which the speed of sound is 344 m/s. How long is
Q0 pipe B?
Q0
A1 0.9 m
A2 1.8 m
A3 3.6 m
A4 0.6 m
A5 1.0 m
Q0
Q0 A sinusoidal sound wave is described by the displacement
Q0   S (x,t) = 2*10**(-8) cos [1.25 x - 1850 t],
Q0 where x is in meters and t is seconds. What is the pressure
Q0 amplitude of this wave if it is traveling in a material
Q0 with a bulk modulus of 2.1*10**9 N/m**2 ?
A1 52.5 Pa
A2 42.5 Pa
A3 62.5 Pa
A4 72.5 Pa
A5 82.5 Pa
Q0
Q0 Two sound waves, from two different sources with the same
Q0 frequency, 540 Hz, travel in the same direction at 344 m/s.
Q0 The sources are in phase. What is the phase difference of the
Q0 waves at a point that is 4.40 m from one source and 4.00 m from
Q0 the other source?
Q0
A1 3.95 rad
A2 1.97 rad
A3 0.64 rad
A4 1.27 rad
A5 1.59 rad
Q)
Q0 Two point sources S1 and S2 are placed on the y-axis as
Q0 shown in figure 1. The two sources are in phase and emit
Q0 identical sound waves with frequency 860 Hz. An observer
Q0 starts at point A and moves to point B along a straight
Q0 line parallel to the y-axis. How many points of maximum
Q0 intensity (constructive interference) will he observe?
Q0 (speed of sound in air = 344 m/s).
Q0
A1 5
A2 4
A3 0
A4 1
A5 3
Q0 A sound source located at the origin emits sound with an
Q0 average power of 0.04 W. Two detectors are located on the
Q0 positive x-axis. Detector A is at x = 3.0 m and detector B
Q0 is at 5.0 m. What is the difference in sound level between
Q0 A and B?
A1 4.4 dB
A2 1.1 dB
A3 2.2 dB
A4 3.3 dB
A5 5.5 dB

Q0 A car emitting a sound wave at a certain frequency moves
Q0 along an x-axis (figure 2 a). The car moves directly toward
Q0 detector A and directly away from detector B. The superimposed
Q0 three plots of figure 2 b indicate the displacement function
Q0 s (x) at some time t of the sound wave as measured by detector
Q0 A, by detector B, and by someone in C. Which plot corresponds
Q0 to which measurement?
A1 1 to A , 2 to B , 3 to C
A2 1 to A , 3 to B , 2 to C
A3 2 to A , 1 to B , 3 to C
A4 2 to A , 3 to B , 1 to C
A5 3 to A , 2 to B , 1 to C
Q0
Q2 Q0 How much heat is required to melt ice of mass 500 g at -10
012Q0 deg C to water at 0 deg C?
19 Q0 (specific heat of ice, c, = 2220 J/(kg.K);
Q0 heat of fusion of ice, Lf, = 333*10*3 J/kg)
Q0
A1 1.78*10**5 J
A2 2.05*10**5 J
A3 3.01*10**5 J
A4 9.05*10**5 J
A5 8.45*10**5 J
Q0
Q3 Q0 A steel washer (ring) has an inner diameter of 4.000 cm and
012Q0 an outer diameter of 4.500 cm at 20 deg C. To what temperature
19 Q0 must the washer be heated to just fit over a rod that is
Q0 4.010 cm in diameter?
Q0 (Coefficient of linear expansinon of steel, alpha,
Q0 = 11*10**-6 per C deg)
Q0
A1 247 deg C
A2 315 deg C
A3 100 deg C
A4 509 deg C
A5 -40 deg C
Q0
Q5 Q0 A cylindrical copper rod of length 1.5 m and cross section
012Q0 6.5 cm**2 is insulated to prevent heat loss through its surface.
19 Q0 The ends are maintained at a temperature difference of
Q0 100 C deg by having one end in a water-ice mixture and the
Q0 other in boiling water and steam. How much ice is melted per
Q0 hour at the cold end?
Q0 (thermal conductivity of copper, kappa, = 401 W/(m.K);
Q0 heat of fusion of ice, Lf, = 333*10*3 J/kg)
Q0
A1 188 g
A2 281 g
A3 330 g
A4 980 g
A5 469 g
Q0
Q6 Q0
19 Q0 Two moles of a monatomic ideal gas at a temperature of 300 K
012Q0 and pressure of 0.20 atm is compressed isothermally (constant
Q0 temperature) to a pressure of 0.80 atm. Find the work done by
Q0 the gas.
Q0
A1 -6900 J
A2 +6900 J
A3 -18000 J

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   A4 +18000 J
   A5  0     J
   Q0
Q7 Q0 Body A is at a higher temperature than Body B.  When they are
012Q0 placed in contact, heat will flow from A to B
19 Q0
   A1 until both have the same temperature
   A2 only if the specific heat of A is larger that that of B
   A3 only if the volume of A is larger than that of B
   A4 only if A has the greater internal energy content
   A5 only if the thermal conductivity of A is greater than that of B
   Q0
Q1 Q0 An ideal gas undergoes an isothermal process starting with a
20 Q0 pressure of 2*10**5 Pa and a volume of 6 cm3.  Which of the
   Q0 following might be the pressure and volume of the final state?
   Q0
   A1 6*10**5 Pa and 2  cm**3
   A2 1*10**5 Pa and 10 cm**3
   A3 3*10**5 Pa and 6  cm**3
   A4 4*10**5 Pa and 4  cm**3
   A5 8*10**5 Pa and 2  cm**3
   Q0
Q2 Q0 Two moles of a monatomic ideal gas is compressed at a constant
20 Q0 pressure of 1.5 atm from a volume of 70 liters to 35 liters.
   Q0 Calculate the change in internal energy of the gas.
   Q0
   A1 - 1.3*10**4  J
   A2 - 0.87*10**4 J
   A3 - 3.5*10**4  J
   A4   2.4*10**4  J
   A5 - 1.9*10**4  J
   Q0
Q3 Q0 In an adiabatic process, the temperature of one mole of an
20 Q0 ideal monatomic gas is decreased from 500 K to 400 K.
   Q0 What is the work done during the process in calories?
   Q0
   A1 300
   A2 500
   A3 200
   A4 100
   A5 400
   Q0
Q4 Q0 The figure shows 5 paths traversed by a gas on a P-V diagram.
20 Q0 For which of the 5 paths is the change in internal energy
   Q0 the greatest?
   Q0
   A1 5
   A2 1 and 2
   A3 5 and 4
   A4 3
   A5 4
   Q0
Q6 Q0 One mole of an ideal monatomic gas is taken through the cyclic
20 Q0 process shown in the figure. Calculate the net heat (lost or
   Q0 gained) by the gas during one complete cycle.
   Q0
   A1 4*Po*Vo Joule (lost)
   A2 2*Po*Vo Joule (lost)
   A3 3*Po*Vo Joule (lost)
   A4 4*Po*Vo Joule (gained)
   A5 2*Po*Vo Joule (gained)
```

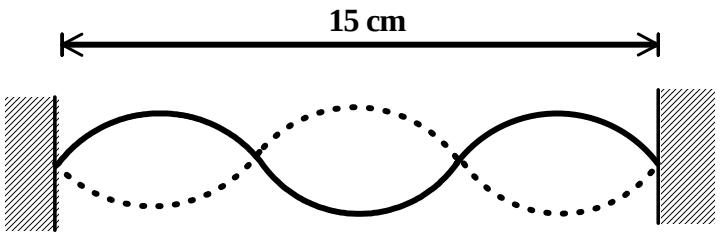


Fig. (1)

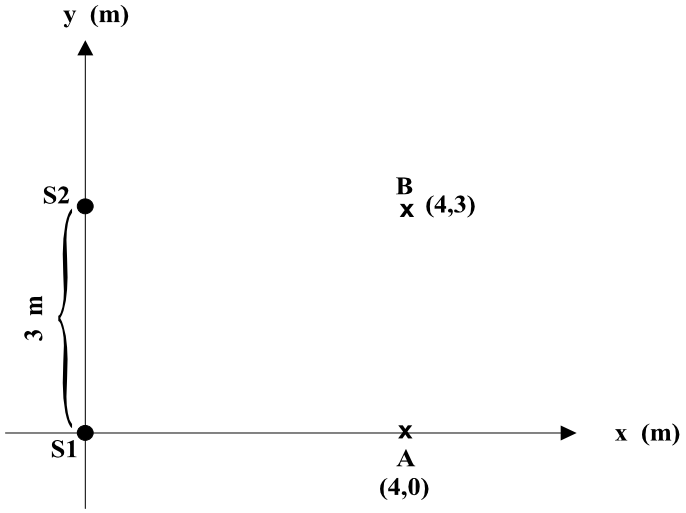
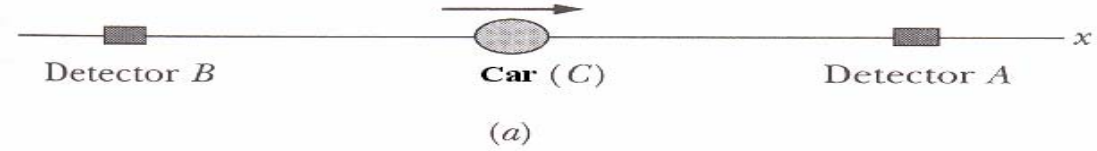
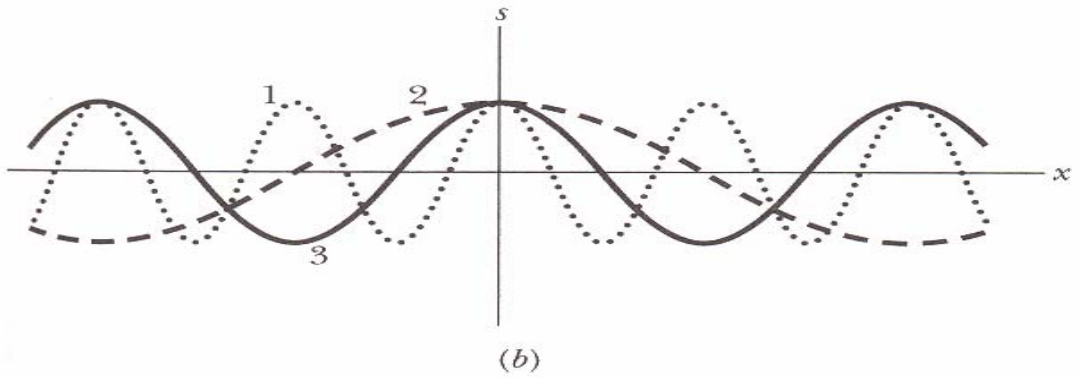


Fig. (2)



(a)



(b)

Fig. (3)

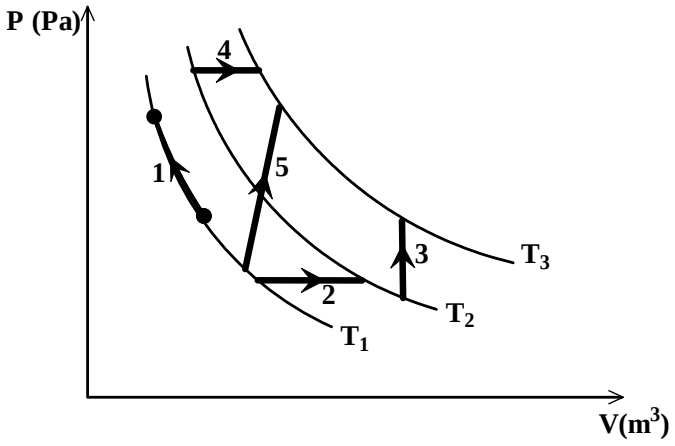


Fig. (4)

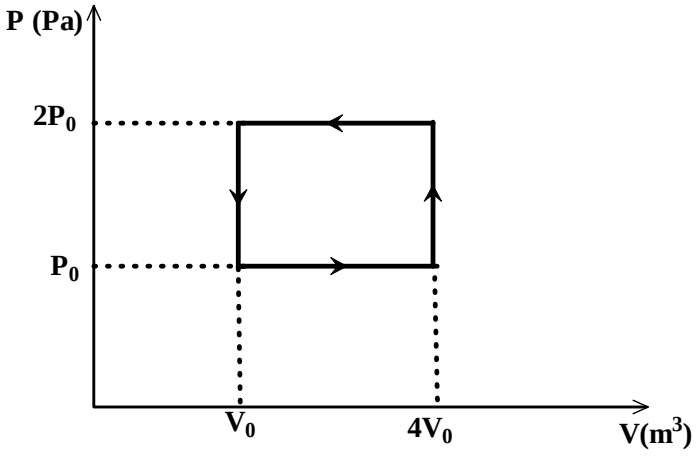


Fig. (5)