

A wave on a string is reflected from a fixed end. The reflected wave.

- A. Is in phase with the original wave at the end
- B. Is 180° out of phase with the original wave at the end
- C. Has a larger amplitude than the original wave
- D. Has a larger speed than the original wave

ANSWER: B

A standing wave.

- A. Can be constructed from two similar waves traveling in opposite directions
- B. Must be transverse
- C. Must be longitudinal
- D. Has motionless points that are closer than half a wavelength

ANSWER: A

When a certain string is clamped at both ends, the lowest four resonant frequencies are measured to be 100, 150, 200, and 250Hz. One of the resonant frequencies (below 200Hz) is missing. What is it.

- A. 25Hz
- B. 50Hz
- C. 75Hz
- D. 125Hz

ANSWER: B

A string, clamped at its ends, vibrates in three segments. The string is 100cm long. The wavelength is.

- A. 33.3cm
- B. 66.7cm
- C. 150cm
- D. Need to know the frequency

ANSWER: B

Beats" in sound refer to.

- A. Interference of two waves of the same frequency
- B. Combination of two waves of slightly different frequency
- C. Reversal of phase of reflected wave relative to incident wave
- D. Two media having slightly different sound velocities

ANSWER: B

To produce beats it is necessary to use two waves.

- A. Traveling in opposite directions
- B. Of slightly different frequencies
- C. Of equal wavelengths
- D. Of equal amplitudes

ANSWER: B

In order for two sound waves to produce audible beats, it is essential that the two waves have.

- A. The same amplitude
- B. The same frequency
- C. Slightly different frequencies
- D. Slightly different amplitudes

ANSWER: C

Two stationary tuning forks (350 and 352Hz) are struck simultaneously. The resulting sound is observed to.

- A. Beat with a frequency of 2beats/s
- B. Beat with a frequency of 351beats/s
- C. Be loud but not beat
- D. Be Doppler shifted by 2Hz

ANSWER: A

Which of the following properties of a sound wave determine its “pitch”.

- A. Amplitude
- B. Distance from source to detector
- C. Frequency
- D. Phase

ANSWER: C

If two objects are in thermal equilibrium with each other.

- A. They cannot be moving
- B. They cannot be undergoing an elastic collision
- C. They cannot have different pressures
- D. They cannot be at different temperatures

ANSWER: D

When two gases separated by a diathermal wall are in thermal equilibrium with each other.

- A. Only their pressures must be the same
- B. Only their volumes must be the same
- C. Only their temperatures must be the same
- D. They must have the same pressure and the same volume

ANSWER: C

Suppose object C is in thermal equilibrium with object A and with object B. The zeroth law of thermodynamics states.

- A. That C will always be in thermal equilibrium with both A and B
- B. That C must transfer energy to both A and B
- C. That A is in thermal equilibrium with B
- D. That A cannot be in thermal equilibrium with B

ANSWER: C

The Zeroth law of thermodynamics allows us to define.

- A. Work
- B. Pressure
- C. Temperature
- D. Thermal equilibrium

ANSWER: C

The “triple point” of a substance is that point for which the temperature and pressure are such that.

- A. Only solid and liquid are in equilibrium
- B. Only liquid and vapor are in equilibrium
- C. Only solid and vapor are in equilibrium
- D. Solid, liquid, and vapor are all in equilibrium

ANSWER: D

Heat is.

- A. Energy transferred by virtue of a temperature difference
- B. Energy transferred by macroscopic work
- C. Energy content of an object
- D. A temperature difference

ANSWER: A

Heat has the same units as.

- A. Temperature
- B. Work
- C. Energy/time
- D. Heat capacity

ANSWER: B

Two different samples have the same mass and temperature. Equal quantities of energy are absorbed as heat by each. Their final temperatures may be different because the samples have different.

- A. Thermal conductivities
- B. Coefficients of expansion
- C. Densities
- D. Heat capacities

ANSWER: D

For constant-volume processes the heat capacity of gas A is greater than the heat capacity of gas B. We conclude that when they both absorb the same energy as heat at constant volume.

- A. The temperature of A increases more than the temperature of B
- B. The temperature of B increases more than the temperature of A
- C. The internal energy of A increases more than the internal energy of B
- D. The internal energy of B increases more than the internal energy of A

ANSWER: B

According to the first law of thermodynamics, applied to a gas, the increase in the internal energy during any process.

- A. Equals the heat input minus the work done on the gas
- B. Equals the heat input plus the work done on the gas
- C. Equals the work done on the gas minus the heat input
- D. Is independent of the heat input

ANSWER: B

In an adiabatic process.

- A. The energy absorbed as heat equals the work done by the system on its environment
- B. The energy absorbed as heat equals the work done by the environment on the system
- C. The absorbed as heat equals the change in internal energy
- D. The work done by the environment on the system equals the change in internal energy

ANSWER: D

Of the following which might NOT vanish over one cycle of a cyclic process.

- A. The change in the internal energy of the substance
- B. The change in pressure of the substance
- C. The work done by the substance
- D. The change in the volume of the substance

ANSWER: C

Two identical rooms in a house are connected by an open doorway. The temperatures in the two rooms are maintained at different values. Which room contains more air.

- A. The room with higher temperature
- B. The room with lower temperature
- C. The room with higher pressure
- D. Neither because both have the same pressure

ANSWER: B

An isothermal process for an ideal gas is represented on a p-V diagram by.

- A. A horizontal line
- B. A portion of a hyperbola
- C. A portion of an ellipse
- D. A portion of a parabola

ANSWER: B

Bragg's law for x-ray diffraction is $2d\sin\theta = m\lambda$, where the quantity d is.

- A. The height of a unit cell
- B. The smallest interatomic distance
- C. The distance from detector to sample
- D. The distance between planes of atoms

ANSWER: D

A real gas is changed slowly from state 1 to state 2. During this process no work is done on or by the gas. This process must be.

- A. Isothermal
- B. Adiabatic
- C. Isochoric
- D. Isobaric

ANSWER: C

According to the kinetic theory of gases, the pressure of a gas is due to.

- A. Change of kinetic energy of molecules as they strike the wall
- B. Change of momentum of molecules as they strike the wall
- C. Average kinetic energy of the molecules
- D. Force of repulsion between the molecules

ANSWER: B

Air is pumped into a bicycle tire at constant temperature. The pressure increases because.

- A. More molecules strike the tire wall per second
- B. The molecules are larger
- C. The molecules are farther apart
- D. Each molecule is moving faster

ANSWER: A

The temperature of a gas is most closely related to.

- A. The kinetic energy of translation of its molecules
- B. Its total molecular kinetic energy
- C. The sizes of its molecules
- D. The potential energy of its molecules

ANSWER: A

Galvanometer can

- A. measure current
- B. detect current
- C. measure current and voltage
- D. measure voltage

ANSWER: B

Galvanometer can be converted into

- A. Voltmeter
- B. Ammeter
- C. Ohmmeter
- D. All of above

ANSWER: D