AP Physics 2 Practice Ladder

Choose one answer per question. Circle A, B, C, or D.

1. In a classroom model, a fixed amount of monatomic ideal gas keeps the same temperature while its volume changes. What happens to its internal energy?
   A. It stays the same.
   B. It increases whenever volume increases.
   C. It decreases whenever volume increases.
   D. It becomes zero when volume changes.

2. In an idealized diagram, a uniform electric field points east. Which direction is the electric force on a small negative test charge placed in the field?
   A. North
   B. East
   C. West
   D. South

3. A light wave crosses a stationary boundary into a material where its speed is lower. What happens to its frequency and wavelength as it enters?
   A. Frequency decreases and wavelength stays the same.
   B. Frequency stays the same and wavelength decreases.
   C. Frequency stays the same and wavelength increases.
   D. Frequency increases and wavelength decreases.

4. A figure stands 0.60 meter in front of a plane mirror. Where does its virtual image appear?
   A. On the surface of the mirror
   B. 0.60 meter in front of the mirror
   C. 1.20 meters behind the mirror
   D. 0.60 meter behind the mirror

5. Two classical ideal gases are at the same absolute temperature. The particles of gas A have greater mass than those of gas B. How do their average translational kinetic energies compare?
   A. Gas A has the greater average energy because its particles are heavier.
   B. The two average energies are equal.
   C. Gas B has the greater average energy because its particles move faster on average.
   D. The average energies cannot be compared without the two container volumes.

6. Two point charges exert an electric force on each other. In a revised model, the magnitude of one charge triples and the distance between them doubles. The other charge stays unchanged. What is the new force magnitude as a fraction of the original?

A. 3/4
B. 3/2
C. 1/4
D. 4/3

7. In an ideal low-voltage circuit model, a resistor has 3.0 volts across it and carries 0.015 ampere. What is the resistor’s resistance?

A. 0.005 ohm
B. 45 ohms
C. 0.20 ohm
D. 200 ohms

8. An ideal 0.60-meter string is fixed at both ends. Its third-harmonic standing wave has three loops between the ends. What is the wavelength?

A. 0.60 meter
B. 0.20 meter
C. 0.40 meter
D. 1.20 meters

9. A ray inside a transparent material reaches a boundary with a lower-index material. Its angle of incidence is greater than the critical angle. What does geometric optics predict?

A. The ray is totally internally reflected.
B. The transmitted ray travels along the boundary.
C. The transmitted ray bends closer to the normal.
D. The ray crosses the boundary without changing direction.

10. In a fictional dataset, a fixed amount of ideal gas at constant volume has a pressure of 90 kilopascals at 300 kelvins. What pressure does the ideal-gas model predict at 400 kelvins?

A. 160 kilopascals
B. 67.5 kilopascals
C. 90 kilopascals
D. 120 kilopascals

11. In a fictional constant-pressure process at 80 kilopascals, a gas expands from 0.50 liter to 0.80 liter and absorbs 40 joules of heat. The only work is expansion work. What is the change in the gas’s internal energy?

A. It decreases by 16 joules.
B. It increases by 64 joules.
C. It increases by 16 joules.
D. It decreases by 24 joules.

12. In a model, a small charge of negative 2 microcoulombs moves from a point at 5 volts to a point at 1 volt. What happens to its electric potential energy?

A. It decreases by 8 microjoules.
B. It increases by 8 microjoules.
C. It increases by 12 microjoules.
D. It decreases by 4 microjoules.

13. A small object is 30 centimeters from an ideal converging lens with a focal length of 10 centimeters. Which description gives the image distance and orientation?

A. 5 centimeters on the object’s side of the lens, upright
B. 15 centimeters on the object’s side of the lens, upright
C. 30 centimeters on the opposite side of the lens, inverted
D. 15 centimeters on the opposite side of the lens, inverted

14. Two coherent waves of equal amplitude and wavelength 0.40 meter start in phase. Their path difference is 0.60 meter at point A and 0.80 meter at point B. Which interference occurs at A and at B, in that order?

A. Destructive, then constructive
B. Constructive, then destructive
C. Constructive at both points
D. Destructive at both points

15. A fictional ideal circuit has a 6.0-volt source and two series resistors of 100 ohms and 200 ohms. What power is transferred to the 200-ohm resistor?

A. 0.120 watt
B. 0.040 watt
C. 0.080 watt
D. 0.180 watt