

AP Physics 2 Practice Test 14

60 original multiple-choice questions covering all 7 AP Physics 2 units (Units 9–15). All questions are algebra-based (no calculus). Choose one answer for each question. The full answer key is on the last page — worked explanations for every question are free on the test page at QuaidianPoint.com.

Name: _____ Class: _____ Score: _____ / 60

Unit 9: Thermodynamics

Q1. A ideal gas in an insulated chamber absorbs 800 J of heat from its surroundings and does 200 J of work on its surroundings. What is the change in its internal energy?

- (A) 1200 J
- (B) 600 J
- (C) 300 J
- (D) 1800 J

Q2. A gas expands at a constant pressure of 400 kPa, increasing its volume by 0.1 m³. How much work does the gas do?

- (A) 80000 J
- (B) 20000 J
- (C) 40000 J
- (D) 120000 J

Q3. A 0.25 kg block of lead (specific heat capacity 240 J/(kg·K)) is heated so its temperature rises by 50 K. How much heat is supplied?

- (A) 6000 J
- (B) 3000 J
- (C) 1500 J
- (D) 9000 J

Q4. How much heat is needed to freeze water at 0°C (specific latent heat of fusion 334,000 J/kg) if the mass involved is 0.8 kg?

- (A) 534400 J
- (B) 133600 J
- (C) 267200 J
- (D) 801600 J

Q5. A reversible heat engine operates between a hot reservoir at 800 K and a cold reservoir at 200 K. What is its maximum possible efficiency?

- (A) 37.5 %
- (B) 25 %
- (C) 85 %
- (D) 75 %

Q6. A heat engine takes in 1000 J of heat in one cycle and does 200 J of useful work. How much heat does it reject to the cold reservoir?

- (A) 800 J
- (B) 1600 J
- (C) 400 J
- (D) 2400 J

Q7. A gas at 150 kPa and 300 K occupies 4 L. Its volume changes to 8 L and its temperature changes to 150 K. What is its new pressure?

- (A) 75 kPa
- (B) 18.75 kPa
- (C) 37.5 kPa
- (D) 112.5 kPa

Q8. An ideal gas is compressed isothermally. What is the change in its internal energy?

- (A) Positive and equal to the work done on it
- (B) Negative and equal to the work done by it
- (C) Zero
- (D) Positive and equal to the heat transferred

Q9. A sealed copper chamber holds 1 mol of an ideal gas at 600 K in a volume of 0.02 m^3 . What is the pressure of the gas? (Use $R = 8.31 \text{ J}/(\text{mol}\cdot\text{K})$.)

- (A) 498600 Pa
- (B) 124650 Pa
- (C) 249300 Pa
- (D) 747900 Pa

Unit 10: Electric Force, Field, and Potential

Q10. What is the electric potential 1 m from a point charge of $8 \mu\text{C}$ in a vacuum? (Use $k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.)

- (A) 144000 V
- (B) 36000 V
- (C) 72000 V
- (D) 216000 V

Q11. Two point charges of $4 \mu\text{C}$ and $4 \mu\text{C}$ are 0.1 m apart in a vacuum. What is their electric potential energy? (Use $k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.)

- (A) 2.88 J
- (B) 0.72 J
- (C) 1.44 J
- (D) 4.32 J

Q12. A charge of $3 \mu\text{C}$ is moved through a potential difference of 100 V. How much work is done by the electric field if the charge moves to a lower potential energy state by that full amount?

- (A) $6 \times 10^{-4} \text{ J}$
- (B) $1.5 \times 10^{-4} \text{ J}$
- (C) $3 \times 10^{-4} \text{ J}$
- (D) $9 \times 10^{-4} \text{ J}$

Q13. Two parallel plates are 0.03 m apart and have a potential difference of 500 V between them. What is the magnitude of the uniform electric field between the plates?

- (A) 40000 N/C
- (B) 20000 N/C
- (C) 10000 N/C
- (D) 60000 N/C

Q14. A positive test charge is placed in an electric field. In which direction does the electric force on it act?

- (A) Opposite to the direction of the electric field
- (B) Perpendicular to the electric field
- (C) In the direction of the electric field
- (D) Toward the nearest negative charge only

Q15. A charge of 5 μC sits at a point where the electric potential is 200 V. What is its electric potential energy?

- (A) $1 \times 10^{-3} \text{ J}$
- (B) $2 \times 10^{-3} \text{ J}$
- (C) $5 \times 10^{-4} \text{ J}$
- (D) $3 \times 10^{-3} \text{ J}$

Q16. Two small charged spheres carry charges of 2 μC and 3 μC and are 0.1 m apart in a vacuum. What is the magnitude of the electrostatic force between them? (Use $k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.)

- (A) 10.8 N
- (B) 2.7 N
- (C) 5.4 N
- (D) 16.2 N

Q17. The distance between two point charges is halved, with both charges unchanged. By what factor does the electrostatic force change?

- (A) It becomes 2 times its original value
- (B) It becomes 1/2 of its original value
- (C) It becomes 1/4 of its original value
- (D) It becomes 4 times its original value

Q18. What is the magnitude of the electric field 0.1 m from a point charge of 4 μC in a vacuum? (Use $k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$.)

- (A) $3.6 \times 10^6 \text{ N/C}$
- (B) $7.2 \times 10^6 \text{ N/C}$
- (C) $1.8 \times 10^6 \text{ N/C}$
- (D) $1.08 \times 10^7 \text{ N/C}$

Unit 11: Electric Circuits

Q19. A $4\ \mu\text{F}$ capacitor is charged to $50\ \text{V}$. How much energy is stored in it, in millijoules?

- (A) $10\ \text{mJ}$
- (B) $2.5\ \text{mJ}$
- (C) $15\ \text{mJ}$
- (D) $5\ \text{mJ}$

Q20. Capacitors of $10\ \mu\text{F}$ and $2\ \mu\text{F}$ are connected in parallel. What is their equivalent capacitance?

- (A) $12\ \mu\text{F}$
- (B) $24\ \mu\text{F}$
- (C) $6\ \mu\text{F}$
- (D) $36\ \mu\text{F}$

Q21. A $36\ \text{V}$ battery is connected across resistors of $10\ \Omega$ and $12\ \Omega$ in series. What is the potential difference across the $10\ \Omega$ resistor?

- (A) $32.73\ \text{V}$
- (B) $16.36\ \text{V}$
- (C) $8.18\ \text{V}$
- (D) $49.09\ \text{V}$

Q22. The resistance of a wire is doubled while the voltage across it stays fixed. What happens to the power dissipated?

- (A) It doubles
- (B) It stays the same
- (C) It becomes four times larger
- (D) It halves

Q23. A current of $4\ \text{A}$ flows through a resistor of $30\ \Omega$. What is the potential difference across the resistor?

- (A) $240\ \text{V}$
- (B) $120\ \text{V}$
- (C) $60\ \text{V}$
- (D) $360\ \text{V}$

Q24. Resistors of $5\ \Omega$, $20\ \Omega$, and $12\ \Omega$ are connected in series. What is their equivalent resistance?

- (A) $74\ \Omega$
- (B) $37\ \Omega$
- (C) $18.5\ \Omega$
- (D) $111\ \Omega$

Q25. Resistors of $8\ \Omega$ and $8\ \Omega$ are connected in parallel. What is their equivalent resistance?

- (A) $4\ \Omega$
- (B) $8\ \Omega$
- (C) $2\ \Omega$
- (D) $12\ \Omega$

Q26. A current of 5 A flows through a $10\ \Omega$ resistor. What power is dissipated in the resistor?

- (A) 500 W
- (B) 125 W
- (C) 750 W
- (D) 250 W

Q27. Resistors of $20\ \Omega$ and $5\ \Omega$ are connected in parallel, and this combination is connected in series with a $6\ \Omega$ resistor. What is the equivalent resistance of the whole combination?

- (A) $20\ \Omega$
- (B) $10\ \Omega$
- (C) $5\ \Omega$
- (D) $30\ \Omega$

Unit 12: Magnetism and Electromagnetism

Q28. The magnetic flux through a coil is decreasing. According to Lenz's law, what does the induced current do?

- (A) It creates a magnetic field that tries to increase the flux
- (B) It creates a magnetic field that decreases the flux further
- (C) It flows in the same direction as the original current only
- (D) It stops immediately

Q29. A particle with charge $5\ \mu\text{C}$ moves at $4000\ \text{m/s}$ perpendicular to a uniform magnetic field of $1\ \text{T}$. What is the magnitude of the magnetic force on the particle, in millinewtons?

- (A) 40 mN
- (B) 10 mN
- (C) 60 mN
- (D) 20 mN

Q30. A particle with charge $4\ \mu\text{C}$ moves at $2000\ \text{m/s}$ perpendicular to a uniform magnetic field of $0.2\ \text{T}$. What is the magnitude of the magnetic force on the particle, in millinewtons?

- (A) 3.2 mN
- (B) 0.8 mN
- (C) 4.8 mN
- (D) 1.6 mN

Q31. A straight wire of length $0.5\ \text{m}$ carries a current of $10\ \text{A}$ perpendicular to a uniform magnetic field of $0.1\ \text{T}$. What is the magnitude of the magnetic force on the wire?

- (A) 1 N
- (B) 0.5 N
- (C) 0.25 N
- (D) 1.5 N

Q32. A long solenoid has 800 turns per metre and carries a current of 2 A. What is the magnetic field strength inside the solenoid, in millitesla? (Use $\mu_0 = 4\pi \times 10^{-7} \text{ T}\cdot\text{m/A}$.)

- (A) 4.02 mT
- (B) 1.01 mT
- (C) 2.01 mT
- (D) 6.03 mT

Q33. A long straight wire carries a current of 20 A. What is the magnetic field strength at a distance of 0.1 m from the wire, in microtesla? (Use $\mu_0 = 4\pi \times 10^{-7} \text{ T}\cdot\text{m/A}$.)

- (A) 80 μT
- (B) 20 μT
- (C) 40 μT
- (D) 120 μT

Q34. A flat coil of area 0.01 m^2 sits in a uniform magnetic field of 2 T. The field makes an angle of 0° with the normal to the coil. What is the magnetic flux through the coil?

- (A) 0.04 Wb
- (B) 0.01 Wb
- (C) 0.06 Wb
- (D) 0.02 Wb

Q35. A coil with 50 turns experiences a change in magnetic flux of 0.04 Wb in 0.01 s. What is the magnitude of the induced emf in the coil?

- (A) 200 V
- (B) 400 V
- (C) 100 V
- (D) 600 V

Unit 13: Geometric Optics

Q36. An object is placed 30 cm from a concave mirror of focal length 15 cm. What is the image distance?

- (A) 30 cm
- (B) 60 cm
- (C) 15 cm
- (D) 90 cm

Q37. An object is 60 cm from a mirror and its image forms 10 cm from the mirror. What is the lateral magnification?

- (A) -0.33
- (B) -0.08
- (C) -0.5
- (D) -0.17

Q38. An object is placed 24 cm from a converging lens of focal length 12 cm. What is the image distance?

- (A) 48 cm
- (B) 12 cm
- (C) 72 cm
- (D) 24 cm

Q39. A ray travels from glass (refractive index 1.5) into air (refractive index 1) with sin of the angle of incidence equal to 0.4. What is sin of the angle of refraction?

- (A) 0.6
- (B) 0.4
- (C) 0.3
- (D) 0.7

Q40. Light travels at 1.5×10^8 m/s in a sample of clear plastic. What is the refractive index of the sample? (Use $c = 3.00 \times 10^8$ m/s.)

- (A) 4
- (B) 2
- (C) 1
- (D) 6

Q41. A transparent material has refractive index 2.42. At what speed does light travel in it, in units of 10^8 m/s? (Use $c = 3.00 \times 10^8$ m/s.)

- (A) 2.48×10^8 m/s
- (B) 1.24×10^8 m/s
- (C) 0.62×10^8 m/s
- (D) 3.72×10^8 m/s

Q42. Light in a medium of refractive index 2.42 strikes the boundary with a medium of refractive index 1. What is sin of the critical angle for total internal reflection?

- (A) 0.21
- (B) 0.41
- (C) 0.59
- (D) 0.61

Q43. A spherical mirror has a radius of curvature of 84 cm. What is its focal length?

- (A) 84 cm
- (B) 21 cm
- (C) 126 cm
- (D) 42 cm

Unit 14: Waves, Sound, and Physical Optics

Q44. An open pipe of length 1 m is filled with air in which sound travels at 340 m/s. What is its fundamental frequency?

- (A) 170 Hz
- (B) 340 Hz
- (C) 85 Hz
- (D) 510 Hz

Q45. Two tuning forks of frequencies 512 Hz and 518 Hz sound together. What is the beat frequency heard?

- (A) 6 Hz
- (B) 12 Hz
- (C) 3 Hz
- (D) 18 Hz

Q46. In a double-slit experiment, light of wavelength 600 nm passes through slits 0.2 mm apart and falls on a screen 1 m away. How far from the central maximum is the third bright fringe, in millimetres?

- (A) 18 mm
- (B) 4.5 mm
- (C) 27 mm
- (D) 9 mm

Q47. Light of wavelength 550 nm passes through double slits 0.15 mm apart onto a screen 1.5 m away. What is the spacing between adjacent bright fringes, in millimetres?

- (A) 11 mm
- (B) 2.75 mm
- (C) 16.5 mm
- (D) 5.5 mm

Q48. A source emitting 450 Hz moves away from a stationary observer at 68 m/s. The speed of sound is 340 m/s. What frequency does the observer hear?

- (A) 750 Hz
- (B) 375 Hz
- (C) 187.5 Hz
- (D) 1125 Hz

Q49. A wave completes one full oscillation in 0.02 s. What is its frequency?

- (A) 100 Hz
- (B) 25 Hz
- (C) 150 Hz
- (D) 50 Hz

Q50. Two waves of the same frequency meet in phase (crest on crest). What kind of interference occurs and what happens to the amplitude?

- (A) Destructive interference; amplitude increases
- (B) Constructive interference; amplitude decreases
- (C) Destructive interference; amplitude stays the same
- (D) Constructive interference; amplitude increases

Q51. A pipe closed at one end has length 1 m and sound travels at 340 m/s inside it. What is the frequency of its third harmonic? (Only odd harmonics exist for this pipe.)

- (A) 510 Hz
- (B) 127.5 Hz
- (C) 255 Hz
- (D) 765 Hz

Unit 15: Modern Physics

Q52. In the Bohr model, the energy of level n is $E_n = -13.6 \div n^2$ eV. What is the energy of level $n = 5$?

- (A) -0.54 eV
- (B) -1.09 eV
- (C) -0.27 eV
- (D) -1.63 eV

Q53. An electron in a hydrogen atom drops from level $n = 4$ to level $n = 3$. What is the energy of the photon emitted?

- (A) 0.66 eV
- (B) 1.32 eV
- (C) 0.33 eV
- (D) 1.98 eV

Q54. A radioactive sample initially has mass 100 g. After 4 half-lives, what mass remains undecayed?

- (A) 12.5 g
- (B) 3.12 g
- (C) 6.25 g
- (D) 18.75 g

Q55. How much energy is equivalent to a mass of 1 kg? (Use $c = 3.00 \times 10^8$ m/s.)

- (A) 1.8×10^{17} J
- (B) 4.5×10^{16} J
- (C) 9×10^{16} J
- (D) 2.7×10^{17} J

Q56. A photon has energy 6.63×10^{-19} J. What is its frequency, in units of 10^{14} Hz? (Use $h = 6.63 \times 10^{-34}$ J·s.)

- (A) 20×10^{14} Hz
- (B) 10×10^{14} Hz
- (C) 5×10^{14} Hz
- (D) 30×10^{14} Hz

Q57. An electron and a proton have the same momentum. Which has the longer de Broglie wavelength?

- (A) The electron, because it is lighter
- (B) They have the same wavelength
- (C) The proton, because it is heavier
- (D) Neither has a wavelength

Q58. A photon has frequency 7×10^{14} Hz. What is its energy? (Use $h = 6.63 \times 10^{-34}$ J·s.)

- (A) 4.64×10^{-19} J
- (B) 9.28×10^{-19} J
- (C) 2.32×10^{-19} J
- (D) 1.39×10^{-18} J

Q59. What is the energy of a photon of wavelength 450 nm? (Use $h = 6.63 \times 10^{-34}$ J·s and $c = 3.00 \times 10^8$ m/s.)

- (A) 4.42×10^{-19} J
- (B) 8.84×10^{-19} J
- (C) 2.21×10^{-19} J
- (D) 1.33×10^{-18} J

Q60. Light of photon energy 5.6 eV falls on a metal with work function 2.1 eV. What is the maximum kinetic energy of the emitted photoelectrons?

- (A) 7 eV
- (B) 3.5 eV
- (C) 1.75 eV
- (D) 10.5 eV

Answer Key

Q1: B	Q11: C	Q21: B	Q31: B	Q41: B	Q51: C
Q2: C	Q12: C	Q22: D	Q32: C	Q42: B	Q52: A
Q3: B	Q13: B	Q23: B	Q33: C	Q43: D	Q53: A
Q4: C	Q14: C	Q24: B	Q34: D	Q44: A	Q54: C
Q5: D	Q15: A	Q25: A	Q35: A	Q45: A	Q55: C
Q6: A	Q16: C	Q26: D	Q36: A	Q46: D	Q56: B
Q7: C	Q17: D	Q27: B	Q37: D	Q47: D	Q57: B
Q8: C	Q18: A	Q28: A	Q38: D	Q48: B	Q58: A
Q9: C	Q19: D	Q29: D	Q39: A	Q49: D	Q59: A
Q10: C	Q20: A	Q30: D	Q40: B	Q50: D	Q60: B

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