

AP Physics 2 Practice Test 15

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. How much heat is needed to melt ice at 0°C (specific latent heat of fusion 334,000 J/kg) if the mass involved is 2 kg?

- (A) 668000 J
- (B) 1.34×10^6 J
- (C) 334000 J
- (D) 2×10^6 J

Q2. A reversible heat engine operates between a hot reservoir at 600 K and a cold reservoir at 300 K. What is its maximum possible efficiency?

- (A) 50 %
- (B) 25 %
- (C) 60 %
- (D) 40 %

Q3. A heat engine takes in 10000 J of heat in one cycle and does 1500 J of useful work. How much heat does it reject to the cold reservoir?

- (A) 17000 J
- (B) 4250 J
- (C) 25500 J
- (D) 8500 J

Q4. A gas at 200 kPa and 300 K occupies 5 L. Its volume changes to 10 L and its temperature changes to 150 K. What is its new pressure?

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

Q5. Which statement about entropy is correct for an isolated system?

- (A) Its total entropy never decreases
- (B) Its total entropy never increases
- (C) Its total entropy always stays exactly constant
- (D) Its total entropy decreases whenever work is done

Q6. A pressurised storage vessel holds 1 mol of an ideal gas at 250 K in a volume of 0.04 m³. What is the pressure of the gas? (Use $R = 8.31 \text{ J}/(\text{mol}\cdot\text{K})$.)

- (A) 103875 Pa
- (B) 51937.5 Pa
- (C) 25968.75 Pa
- (D) 155812.5 Pa

Q7. An ideal gas sample contains 5 mol at 300 K and a pressure of 100 kPa. What is its volume? (Use $R = 8.31 \text{ J}/(\text{mol}\cdot\text{K})$.)

- (A) 0.25 m^3
- (B) 0.06 m^3
- (C) 0.12 m^3
- (D) 0.37 m^3

Q8. A ideal gas in an insulated chamber absorbs 1500 J of heat from its surroundings and does 150 J of work on its surroundings. What is the change in its internal energy?

- (A) 2700 J
- (B) 675 J
- (C) 1350 J
- (D) 4050 J

Q9. A gas expands at a constant pressure of 500 kPa, increasing its volume by 0.1 m^3 . How much work does the gas do?

- (A) 100000 J
- (B) 25000 J
- (C) 150000 J
- (D) 50000 J

Unit 10: Electric Force, Field, and Potential

Q10. Two parallel plates are 0.02 m apart and have a potential difference of 200 V between them. What is the magnitude of the uniform electric field between the plates?

- (A) 20000 N/C
- (B) 10000 N/C
- (C) 5000 N/C
- (D) 30000 N/C

Q11. A charge of $8 \text{ } \mu\text{C}$ sits at a point where the electric potential is 200 V. What is its electric potential energy?

- (A) $3.2 \times 10^{-3} \text{ J}$
- (B) $8 \times 10^{-4} \text{ J}$
- (C) $1.6 \times 10^{-3} \text{ J}$
- (D) $4.8 \times 10^{-3} \text{ J}$

Q12. A charge of $8 \text{ } \mu\text{C}$ sits at a point where the electric potential is 500 V. What is its electric potential energy?

- (A) $8 \times 10^{-3} \text{ J}$
- (B) $2 \times 10^{-3} \text{ J}$
- (C) 0.01 J
- (D) $4 \times 10^{-3} \text{ J}$

Q13. Two small charged spheres carry charges of $2\ \mu\text{C}$ and $8\ \mu\text{C}$ and are $0.2\ \text{m}$ 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) $7.2\ \text{N}$
- (B) $1.8\ \text{N}$
- (C) $10.8\ \text{N}$
- (D) $3.6\ \text{N}$

Q14. What is the magnitude of the electric field $0.2\ \text{m}$ from a point charge of $2\ \mu\text{C}$ in a vacuum? (Use $k = 9.0 \times 10^9\ \text{N}\cdot\text{m}^2/\text{C}^2$.)

- (A) $450000\ \text{N/C}$
- (B) $900000\ \text{N/C}$
- (C) $225000\ \text{N/C}$
- (D) $1.35 \times 10^6\ \text{N/C}$

Q15. What is the magnitude of the electric field $0.5\ \text{m}$ from a point charge of $2\ \mu\text{C}$ in a vacuum? (Use $k = 9.0 \times 10^9\ \text{N}\cdot\text{m}^2/\text{C}^2$.)

- (A) $72000\ \text{N/C}$
- (B) $144000\ \text{N/C}$
- (C) $36000\ \text{N/C}$
- (D) $216000\ \text{N/C}$

Q16. A small charge of $5\ \mu\text{C}$ is placed in a uniform electric field of $3000\ \text{N/C}$. What is the magnitude of the electric force on the charge?

- (A) $0.03\ \text{N}$
- (B) $0.01\ \text{N}$
- (C) $7.5 \times 10^{-3}\ \text{N}$
- (D) $0.04\ \text{N}$

Q17. What is the electric potential $0.2\ \text{m}$ from a point charge of $2\ \mu\text{C}$ in a vacuum? (Use $k = 9.0 \times 10^9\ \text{N}\cdot\text{m}^2/\text{C}^2$.)

- (A) $180000\ \text{V}$
- (B) $45000\ \text{V}$
- (C) $270000\ \text{V}$
- (D) $90000\ \text{V}$

Q18. Two point charges of $3\ \mu\text{C}$ and $6\ \mu\text{C}$ are $0.1\ \text{m}$ 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) $3.24\ \text{J}$
- (B) $1.62\ \text{J}$
- (C) $0.81\ \text{J}$
- (D) $4.86\ \text{J}$

Unit 11: Electric Circuits

Q19. An ideal ammeter is used to measure the current through a resistor. How should it be connected?

- (A) In parallel with the resistor
- (B) Across the battery only
- (C) In series with the resistor
- (D) In place of the battery

Q20. A potential difference of 12 V is applied across a resistor of 6 Ω . What current flows through it?

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

Q21. Resistors of 12 Ω , 8 Ω , and 6 Ω are connected in series. What is their equivalent resistance?

- (A) 52 Ω
- (B) 26 Ω
- (C) 13 Ω
- (D) 78 Ω

Q22. Resistors of 12 Ω and 6 Ω are connected in parallel. What is their equivalent resistance?

- (A) 8 Ω
- (B) 2 Ω
- (C) 12 Ω
- (D) 4 Ω

Q23. A current of 2 A flows through a 20 Ω resistor. What power is dissipated in the resistor?

- (A) 80 W
- (B) 160 W
- (C) 40 W
- (D) 240 W

Q24. Resistors of 12 Ω and 4 Ω are connected in parallel, and this combination is connected in series with a 5 Ω resistor. What is the equivalent resistance of the whole combination?

- (A) 8 Ω
- (B) 16 Ω
- (C) 4 Ω
- (D) 24 Ω

Q25. A capacitor of capacitance 20 μF is connected across a 100 V battery. What charge is stored on the capacitor?

- (A) 4000 μC
- (B) 2000 μC
- (C) 1000 μC
- (D) 6000 μC

Q26. A 10 μF capacitor is charged to 50 V. How much energy is stored in it, in millijoules?

- (A) 25 mJ
- (B) 6.25 mJ
- (C) 12.5 mJ
- (D) 37.5 mJ

Q27. Capacitors of $10\ \mu\text{F}$ and $5\ \mu\text{F}$ are connected in parallel. What is their equivalent capacitance?

- (A) $15\ \mu\text{F}$
- (B) $30\ \mu\text{F}$
- (C) $7.5\ \mu\text{F}$
- (D) $45\ \mu\text{F}$

Unit 12: Magnetism and Electromagnetism

Q28. A straight wire of length $0.5\ \text{m}$ carries a current of $12\ \text{A}$ perpendicular to a uniform magnetic field of $0.5\ \text{T}$. What is the magnitude of the magnetic force on the wire?

- (A) $3\ \text{N}$
- (B) $6\ \text{N}$
- (C) $1.5\ \text{N}$
- (D) $9\ \text{N}$

Q29. A long solenoid has 400 turns per metre and carries a current of $2\ \text{A}$. 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) $2.01\ \text{mT}$
- (B) $0.5\ \text{mT}$
- (C) $3.02\ \text{mT}$
- (D) $1.01\ \text{mT}$

Q30. A long straight wire carries a current of $20\ \text{A}$. What is the magnetic field strength at a distance of $0.25\ \text{m}$ from the wire, in microtesla? (Use $\mu_0 = 4\pi \times 10^{-7}\ \text{T}\cdot\text{m/A}$.)

- (A) $32\ \mu\text{T}$
- (B) $8\ \mu\text{T}$
- (C) $48\ \mu\text{T}$
- (D) $16\ \mu\text{T}$

Q31. A flat coil of area $0.02\ \text{m}^2$ sits in a uniform magnetic field of $0.8\ \text{T}$. The field makes an angle of 60° with the normal to the coil. What is the magnetic flux through the coil?

- (A) $0.02\ \text{Wb}$
- (B) $4 \times 10^{-3}\ \text{Wb}$
- (C) $8 \times 10^{-3}\ \text{Wb}$
- (D) $0.01\ \text{Wb}$

Q32. A coil with 10 turns experiences a change in magnetic flux of $0.04\ \text{Wb}$ in $0.05\ \text{s}$. What is the magnitude of the induced emf in the coil?

- (A) $8\ \text{V}$
- (B) $16\ \text{V}$
- (C) $4\ \text{V}$
- (D) $24\ \text{V}$

Q33. A conducting rod of length 0.2 m moves at 5 m/s perpendicular to a uniform magnetic field of 0.8 T. What is the motional emf induced between its ends?

- (A) 1.6 V
- (B) 0.8 V
- (C) 0.4 V
- (D) 2.4 V

Q34. A rectangular coil with 20 turns, area 0.05 m^2 , carries 2 A in a magnetic field of 0.5 T. The angle in the torque formula is 30° . What is the magnitude of the magnetic torque on the coil?

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

Q35. A proton moves parallel to a uniform 0.9 T magnetic field. What is the magnitude of the magnetic force acting on the proton?

- (A) Maximum and in the direction of motion
- (B) Maximum and opposite to the direction of motion
- (C) Zero
- (D) Equal to qvB in the field direction

Unit 13: Geometric Optics

Q36. A ray travels from air (refractive index 1) into water (refractive index 1.33) with $\sin$ of the angle of incidence equal to 0.8. What is $\sin$ of the angle of refraction?

- (A) 0.8
- (B) 0.3
- (C) 0.4
- (D) 0.6

Q37. Light travels at $2.25 \times 10^8 \text{ m/s}$ in a sample of diamond-like material. What is the refractive index of the sample? (Use $c = 3.00 \times 10^8 \text{ m/s}$.)

- (A) 2.67
- (B) 0.67
- (C) 4
- (D) 1.33

Q38. A transparent material has refractive index 2. At what speed does light travel in it, in units of 10^8 m/s ? (Use $c = 3.00 \times 10^8 \text{ m/s}$.)

- (A) $3 \times 10^8 \text{ m/s}$
- (B) $1.5 \times 10^8 \text{ m/s}$
- (C) $0.75 \times 10^8 \text{ m/s}$
- (D) $4.5 \times 10^8 \text{ m/s}$

Q39. Light in a medium of refractive index 2 strikes the boundary with a medium of refractive index 1. What is $\sin$ of the critical angle for total internal reflection?

- (A) 0.25
- (B) 0.5
- (C) 0.7
- (D) 0.6

Q40. A spherical mirror has a radius of curvature of 46 cm. What is its focal length?

- (A) 46 cm
- (B) 23 cm
- (C) 11.5 cm
- (D) 69 cm

Q41. A converging lens of focal length 15 cm forms an image 45 cm from the lens. How far from the lens is the object?

- (A) 22.5 cm
- (B) 45 cm
- (C) 11.25 cm
- (D) 67.5 cm

Q42. An object is placed beyond the centre of curvature of a concave mirror. What kind of image is formed?

- (A) Virtual, upright, and magnified
- (B) Real, inverted, and diminished
- (C) Real, upright, and magnified
- (D) Virtual, inverted, and diminished

Q43. An object is placed 40 cm from a concave mirror of focal length 20 cm. What is the image distance?

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

Unit 14: Waves, Sound, and Physical Optics

Q44. Light of wavelength 500 nm passes through double slits 0.25 mm apart onto a screen 2 m away. What is the spacing between adjacent bright fringes, in millimetres?

- (A) 8 mm
- (B) 4 mm
- (C) 2 mm
- (D) 12 mm

Q45. A source emitting 500 Hz moves away from a stationary observer at 85 m/s. The speed of sound is 340 m/s. What frequency does the observer hear?

- (A) 800 Hz
- (B) 200 Hz
- (C) 400 Hz
- (D) 1200 Hz

Q46. A wave completes one full oscillation in 0.25 s. What is its frequency?

- (A) 4 Hz
- (B) 8 Hz
- (C) 2 Hz
- (D) 12 Hz

Q47. Sound travels from air into water. What happens to its frequency?

- (A) It increases
- (B) It decreases
- (C) It stays the same
- (D) It becomes zero

Q48. A pipe closed at one end has length 0.5 m and sound travels at 340 m/s inside it. What is the frequency of its fifth harmonic? (Only odd harmonics exist for this pipe.)

- (A) 1700 Hz
- (B) 425 Hz
- (C) 850 Hz
- (D) 2550 Hz

Q49. A sound wave travels at 400 m/s with frequency 400 Hz. What is its wavelength?

- (A) 2 m
- (B) 0.5 m
- (C) 3 m
- (D) 1 m

Q50. A string of length 0.6 m is fixed at both ends. Waves travel along it at 400 m/s. What is the frequency of its third harmonic?

- (A) 2000 Hz
- (B) 500 Hz
- (C) 1000 Hz
- (D) 3000 Hz

Q51. An open pipe of length 0.5 m is filled with air in which sound travels at 340 m/s. What is its fundamental frequency?

- (A) 680 Hz
- (B) 170 Hz
- (C) 1020 Hz
- (D) 340 Hz

Unit 15: Modern Physics

Q52. How much energy is equivalent to a mass of 2 kg? (Use $c = 3.00 \times 10^8$ m/s.)

- (A) 3.6×10^{17} J
- (B) 1.8×10^{17} J
- (C) 9×10^{16} J
- (D) 5.4×10^{17} J

- Q53. A photon has energy 3.98×10^{-19} J. What is its frequency, in units of 10^{14} Hz? (Use $h = 6.63 \times 10^{-34}$ J·s.)**
- (A) 12×10^{14} Hz
 - (B) 3×10^{14} Hz
 - (C) 6×10^{14} Hz
 - (D) 18×10^{14} Hz
- Q54. A photon has frequency 6×10^{14} Hz. What is its energy? (Use $h = 6.63 \times 10^{-34}$ J·s.)**
- (A) 7.96×10^{-19} J
 - (B) 1.99×10^{-19} J
 - (C) 1.19×10^{-18} J
 - (D) 3.98×10^{-19} J
- Q55. A photon has frequency 8×10^{14} Hz. What is its energy? (Use $h = 6.63 \times 10^{-34}$ J·s.)**
- (A) 5.3×10^{-19} J
 - (B) 1.06×10^{-18} J
 - (C) 2.65×10^{-19} J
 - (D) 1.59×10^{-18} J
- Q56. What is the energy of a photon of wavelength 650 nm? (Use $h = 6.63 \times 10^{-34}$ J·s and $c = 3.00 \times 10^8$ m/s.)**
- (A) 6.12×10^{-19} J
 - (B) 3.06×10^{-19} J
 - (C) 1.53×10^{-19} J
 - (D) 9.18×10^{-19} J
- Q57. Light of photon energy 3.5 eV falls on a metal with work function 1.4 eV. What is the maximum kinetic energy of the emitted photoelectrons?**
- (A) 2.1 eV
 - (B) 4.2 eV
 - (C) 1.05 eV
 - (D) 6.3 eV
- Q58. A particle has momentum 13.26×10^{-24} kg·m/s. What is its de Broglie wavelength, in units of 10^{-10} m? (Use $h = 6.63 \times 10^{-34}$ J·s.)**
- (A) 1
 - (B) 0.25
 - (C) 0.5
 - (D) 1.5
- Q59. In the Bohr model, the energy of level n is $E_n = -13.6 \div n^2$ eV. What is the energy of level $n = 2$?**
- (A) -3.4 eV
 - (B) -6.8 eV
 - (C) -1.7 eV
 - (D) -10.2 eV

Q60. An electron in a hydrogen atom drops from level $n = 4$ to level $n = 2$. What is the energy of the photon emitted?

- (A) 5.1 eV
- (B) 1.27 eV
- (C) 2.55 eV
- (D) 7.65 eV

Answer Key

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

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