

AP Physics 2 Practice Test 17

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 0.6 kg lead weight with specific heat capacity 900 J/kg·K is heated through 15 K. How much thermal energy is transferred to it?

- (A) 16200 J
- (B) 8100 J
- (C) 4050 J
- (D) 12150 J

Q2. 1500 J of heat is added to a air in a cylinder while it does 100 J of work on its surroundings. What is the change in its internal energy?

- (A) 2800 J
- (B) 700 J
- (C) 2100 J
- (D) 1400 J

Q3. A gas expands at a constant pressure of 200 kPa, increasing its volume by 0.03 m³. How much work does the gas do?

- (A) 12000 J
- (B) 3000 J
- (C) 9000 J
- (D) 6000 J

Q4. A reversible heat engine operates between reservoirs at 1000 K and 320 K. What is its maximum possible efficiency?

- (A) 136 %
- (B) 34 %
- (C) 102 %
- (D) 68 %

Q5. A heat engine takes in 800 J of heat from a hot reservoir and rejects 400 J to a cold reservoir in one cycle. How much useful work does it do per cycle?

- (A) 800 J
- (B) 400 J
- (C) 200 J
- (D) 600 J

Q6. The absolute temperature of a sample of nitrogen gas rises from 250 K to 750 K, i.e. it is tripled. What happens to the average kinetic energy of its molecules?

- (A) doubles
- (B) halves
- (C) triples
- (D) quadruples

Q7. A sample of helium expands in a piston while the pressure stays constant. Which name describes this process?

- (A) isothermal
- (B) isobaric
- (C) adiabatic
- (D) isovolumetric

Q8. How much energy is needed to melt 3 kg of water at its melting point without changing its temperature? (Latent heat = 2260000 J/kg.)

- (A) 13560000 J
- (B) 3390000 J
- (C) 10170000 J
- (D) 6780000 J

Q9. 13500 J of heat raises the temperature of a 3 kg sample by 15 K. What is the specific heat capacity of the sample material?

- (A) 300 J/kg·K
- (B) 600 J/kg·K
- (C) 150 J/kg·K
- (D) 450 J/kg·K

Unit 10: Electric Force, Field, and Potential

Q10. The potential difference between two parallel plates 10 mm apart is 200 V. 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) 30000 N/C

Q11. Two point charges of 5 μC and 4 μC are held 25 cm apart. What is their electric potential energy? (Use $k = 9.0 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2$, and take zero at infinity.)

- (A) 1.44 J
- (B) 0.36 J
- (C) 1.08 J
- (D) 0.72 J

Q12. A alpha particle is placed in an electric field. In which direction does the electric force on it act?

- (A) In the direction of the field
- (B) Opposite to the field
- (C) Perpendicular to the field
- (D) In the direction of decreasing potential only

Q13. A charge is moved slowly along an equipotential surface around a point charge. How much work is done by the electric field?

- (A) Positive
- (B) Zero
- (C) Negative
- (D) Cannot be determined without the charge

Q14. The distance between two point charges is tripled while both charges stay the same. By what factor does the electrostatic force between them change?

- (A) It doubles
- (B) It halves
- (C) It becomes four times as large
- (D) It becomes one-ninth as large

Q15. Parallel plates 4 mm apart have a potential difference of 360 V. A $10\ \mu\text{C}$ charge between them experiences what force magnitude?

- (A) 0.9 N
- (B) 1.8 N
- (C) 0.45 N
- (D) 1.35 N

Q16. In a uniform field of $1000\ \text{N/C}$, a charge moves 40 cm parallel to the field. What is the magnitude of the potential difference between its start and end points?

- (A) 800 V
- (B) 200 V
- (C) 400 V
- (D) 600 V

Q17. Two point charges of $2\ \mu\text{C}$ and $8\ \mu\text{C}$ are 10 cm 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) 28.8 N
- (B) 7.2 N
- (C) 14.4 N
- (D) 21.6 N

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

- (A) 18000000 N/C
- (B) 4500000 N/C
- (C) 13500000 N/C
- (D) 9000000 N/C

Unit 11: Electric Circuits

Q19. A $50\ \mu\text{F}$ capacitor charged to 10 V stores how much energy, in mJ?

- (A) 2.5 mJ
- (B) 5 mJ
- (C) 1.25 mJ
- (D) 3.75 mJ

Q20. Capacitors of $50\ \mu\text{F}$ and $20\ \mu\text{F}$ are connected in parallel across a $24\ \text{V}$ battery. What total charge is stored, in μC ?

- (A) $1680\ \mu\text{C}$
- (B) $3360\ \mu\text{C}$
- (C) $840\ \mu\text{C}$
- (D) $2520\ \mu\text{C}$

Q21. Capacitors of $10\ \mu\text{F}$ and $30\ \mu\text{F}$ are connected in series across a $12\ \text{V}$ battery. What charge is stored on each capacitor, in μC ?

- (A) $180\ \mu\text{C}$
- (B) $45\ \mu\text{C}$
- (C) $135\ \mu\text{C}$
- (D) $90\ \mu\text{C}$

Q22. A circuit contains a $100\ \text{k}\Omega$ resistor in series with a $100\ \mu\text{F}$ capacitor. What is the time constant of the circuit?

- (A) $20\ \text{s}$
- (B) $5\ \text{s}$
- (C) $15\ \text{s}$
- (D) $10\ \text{s}$

Q23. A battery of emf $36\ \text{V}$ and internal resistance $1\ \Omega$ delivers a current of $3\ \text{A}$. What is the terminal potential difference of the battery?

- (A) $66\ \text{V}$
- (B) $16.5\ \text{V}$
- (C) $49.5\ \text{V}$
- (D) $33\ \text{V}$

Q24. Two identical lamps are connected in series with a $24\ \text{V}$ battery, then reconnected in parallel with the same battery. Compared with the series arrangement, each lamp in parallel is:

- (A) dimmer
- (B) the same brightness
- (C) brighter
- (D) off

Q25. A total current of $15\ \text{A}$ splits between parallel resistors of $4\ \Omega$ and $4\ \Omega$. What current flows through the $4\ \Omega$ resistor?

- (A) $15\ \text{A}$
- (B) $7.5\ \text{A}$
- (C) $3.75\ \text{A}$
- (D) $11.25\ \text{A}$

Q26. A resistor of $6\ \Omega$ is connected across a $24\ \text{V}$ battery. What current flows through the resistor?

- (A) $4\ \text{A}$
- (B) $8\ \text{A}$
- (C) $2\ \text{A}$
- (D) $6\ \text{A}$

Q27. Resistors of $10\ \Omega$, $8\ \Omega$ and $15\ \Omega$ are connected in series across a $60\ \text{V}$ battery. What is the current in the circuit?

- (A) $3.64\ \text{A}$
- (B) $0.91\ \text{A}$
- (C) $2.73\ \text{A}$
- (D) $1.82\ \text{A}$

Unit 12: Magnetism and Electromagnetism

Q28. What is the magnetic field at the centre of a circular loop of radius $4\ \text{cm}$ carrying a current of $4\ \text{A}$?

- (A) $125.66\ \mu\text{T}$
- (B) $62.83\ \mu\text{T}$
- (C) $31.42\ \mu\text{T}$
- (D) $94.25\ \mu\text{T}$

Q29. Two long parallel wires carry currents in the opposite direction. The magnetic force between them is:

- (A) repulsive
- (B) attractive
- (C) zero
- (D) perpendicular to both wires

Q30. A $8\ \mu\text{C}$ particle moves at $3 \times 10^4\ \text{m/s}$ perpendicular to a magnetic field of $2.0\ \text{T}$. What is the magnitude of the magnetic force on it, in mN ?

- (A) $960\ \text{mN}$
- (B) $480\ \text{mN}$
- (C) $240\ \text{mN}$
- (D) $720\ \text{mN}$

Q31. A straight wire of length $1\ \text{m}$ carries a current of $2\ \text{A}$ perpendicular to a uniform magnetic field of $0.5\ \text{T}$. What is the magnitude of the force on the wire?

- (A) $2\ \text{N}$
- (B) $0.5\ \text{N}$
- (C) $1.5\ \text{N}$
- (D) $1\ \text{N}$

Q32. What is the magnitude of the magnetic field $10\ \text{cm}$ from a long straight wire carrying a current of $1\ \text{A}$?

- (A) $4\ \mu\text{T}$
- (B) $1\ \mu\text{T}$
- (C) $3\ \mu\text{T}$
- (D) $2\ \mu\text{T}$

Q33. A solenoid has 500 turns per metre and carries a current of $1\ \text{A}$. What is the magnetic field inside the solenoid, in mT ? (Use $\mu_0 = 4\pi \times 10^{-7}\ \text{T}\cdot\text{m/A}$.)

- (A) $1.26\ \text{mT}$
- (B) $0.63\ \text{mT}$
- (C) $0.31\ \text{mT}$
- (D) $0.94\ \text{mT}$

Q34. A uniform magnetic field of 0.5 T passes through a flat loop of area 0.05 m^2 . The field makes an angle of 0° with the normal to the loop. What is the magnetic flux through the loop, in mWb?

- (A) 50 mWb
- (B) 25 mWb
- (C) 12.5 mWb
- (D) 37.5 mWb

Q35. The magnetic flux through a single loop changes by 0.05 Wb in 0.2 s. What is the magnitude of the average induced emf in the loop?

- (A) 0.5 V
- (B) 0.25 V
- (C) 0.12 V
- (D) 0.38 V

Unit 13: Geometric Optics

Q36. A ray strikes a plane mirror at 50° to the normal. At what angle to the normal is the reflected ray?

- (A) 100 degrees
- (B) 25 degrees
- (C) 50 degrees
- (D) 75 degrees

Q37. An object is placed 40 cm in front of a concave mirror of focal length 20 cm. How far from the mirror is the image formed?

- (A) 40 cm
- (B) 80 cm
- (C) 20 cm
- (D) 60 cm

Q38. An object 60 cm in front of a concave mirror forms an image 120 cm from the mirror. What is the lateral magnification?

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

Q39. An object is placed 75 cm in front of a converging lens of focal length 25 cm. How far from the lens is the image formed?

- (A) 75 cm
- (B) 18.75 cm
- (C) 37.5 cm
- (D) 56.25 cm

Q40. A concave mirror has a radius of curvature of 80 cm. What is its focal length?

- (A) 80 cm
- (B) 20 cm
- (C) 40 cm
- (D) 60 cm

Q41. A ray in air enters a transparent block at an angle of incidence of 50° and refracts at 30° to the normal. Using $\sin 50^\circ = 0.766$ and $\sin 30^\circ = 0.5$, what is the refractive index of the block?

- (A) 3.06
- (B) 0.77
- (C) 1.53
- (D) 2.29

Q42. What is the critical angle for light travelling from a medium of refractive index 1.33 into air? (Use $\sin \theta_c = 1 \div n$.)

- (A) 97.6 degrees
- (B) 24.4 degrees
- (C) 48.8 degrees
- (D) 73.2 degrees

Q43. Light travels at 2.4×10^8 m/s in a oil sample. What is the refractive index of the material? (Use $c = 3.0 \times 10^8$ m/s.)

- (A) 1.25
- (B) 2.5
- (C) 0.62
- (D) 1.88

Unit 14: Waves, Sound, and Physical Optics

Q44. A string of length 0.4 m fixed at both ends supports waves travelling at 200 m/s. What is the frequency of its 2th harmonic?

- (A) 1000 Hz
- (B) 500 Hz
- (C) 250 Hz
- (D) 750 Hz

Q45. An open pipe of length 2.12 m resonates with sound waves travelling at 340 m/s. What is its fundamental frequency?

- (A) 80 Hz
- (B) 160 Hz
- (C) 40 Hz
- (D) 120 Hz

Q46. A pipe closed at one end has length 0.85 m. Sound travels at 340 m/s. What is its fundamental frequency?

- (A) 100 Hz
- (B) 200 Hz
- (C) 50 Hz
- (D) 150 Hz

Q47. Two tuning forks of frequencies 660 Hz and 665 Hz sound together. What is the beat frequency heard?

- (A) 5 Hz
- (B) 10 Hz
- (C) 2.5 Hz
- (D) 7.5 Hz

Q48. A source emitting 680 Hz moves towards a stationary observer at 68 m/s. Sound travels at 340 m/s. What frequency does the observer hear?

- (A) 1700 Hz
- (B) 425 Hz
- (C) 850 Hz
- (D) 1275 Hz

Q49. In a double-slit experiment, light of wavelength 650 nm passes through slits 1 mm apart, with a screen 1 m away. How far from the central maximum is the 1th bright fringe, in mm?

- (A) 1.3 mm
- (B) 0.33 mm
- (C) 0.65 mm
- (D) 0.98 mm

Q50. A point source radiates 120 W of sound uniformly in all directions. What is the intensity at a distance of 4 m? (Use $\pi = 3.14$.)

- (A) 1.19 W/m^2
- (B) 0.6 W/m^2
- (C) 0.3 W/m^2
- (D) 0.9 W/m^2

Q51. In a single-slit diffraction pattern, using a wider slit while keeping the other factors fixed causes the central maximum to become:

- (A) wider
- (B) unchanged in width
- (C) narrower
- (D) brighter but the same width

Unit 15: Modern Physics

Q52. A hydrogen atom transitions from energy level $n = 4$ to $n = 1$. What is the energy of the photon emitted, in eV? (Levels: $E_n = -13.6 \div n^2 \text{ eV}$.)

- (A) 25.5 eV
- (B) 6.38 eV
- (C) 19.12 eV
- (D) 12.75 eV

Q53. What is the energy of a hydrogen atom in level $n = 3$, in units of 10^{-19} J ? (Use $E_n = -13.6 \div n^2 \text{ eV}$ and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.)

- (A) $-4.84 \times 10^{-19} \text{ J}$
- (B) $-1.21 \times 10^{-19} \text{ J}$
- (C) $-2.42 \times 10^{-19} \text{ J}$
- (D) $4.84 \times 10^{-19} \text{ J}$

Q54. A radioactive sample of mass 80 g has a half-life of one hour. How much of it remains undecayed after 4 hours?

- (A) 10 g
- (B) 5 g
- (C) 2.5 g
- (D) 7.5 g

Q55. A radioactive decay has a mass defect of 0.01 u. How much energy is released? (Use $1 \text{ u} = 931.5 \text{ MeV}/c^2$.)

- (A) 9.31 MeV
- (B) 18.63 MeV
- (C) 4.66 MeV
- (D) 13.97 MeV

Q56. A copper surface has work function 1.9 eV. What is its threshold frequency, in units of 10^{14} Hz ? (Use $h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$ and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$.)

- (A) $4.59 \times 10^{14} \text{ Hz}$
- (B) $9.17 \times 10^{14} \text{ Hz}$
- (C) $2.29 \times 10^{14} \text{ Hz}$
- (D) $6.88 \times 10^{14} \text{ Hz}$

Q57. The photoelectric effect provides evidence that light behaves as:

- (A) waves only
- (B) a continuous fluid
- (C) a magnetic field only
- (D) particles (photons)

Q58. According to the Heisenberg uncertainty principle, measuring a electron's position more precisely necessarily:

- (A) increases the uncertainty in its position
- (B) increases the uncertainty in its momentum
- (C) decreases the uncertainty in the other quantity
- (D) leaves the other uncertainty unchanged

Q59. What is the energy, in units of 10^{-19} J , of a photon of frequency $8 \times 10^{14} \text{ Hz}$? (Use $h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$.)

- (A) $5.3 \times 10^{-19} \text{ J}$
- (B) $10.61 \times 10^{-19} \text{ J}$
- (C) $2.65 \times 10^{-19} \text{ J}$
- (D) $7.96 \times 10^{-19} \text{ J}$

Q60. Light photons of energy 5.5 eV strike a metal with work function 2 eV. What is the maximum kinetic energy of the emitted photoelectrons, in eV?

- (A) 7 eV
- (B) 1.75 eV
- (C) 3.5 eV
- (D) 5.25 eV

Answer Key

Q1: B	Q11: D	Q21: D	Q31: D	Q41: C	Q51: C
Q2: D	Q12: A	Q22: D	Q32: D	Q42: C	Q52: D
Q3: D	Q13: B	Q23: D	Q33: B	Q43: A	Q53: C
Q4: D	Q14: D	Q24: C	Q34: B	Q44: B	Q54: B
Q5: B	Q15: A	Q25: B	Q35: B	Q45: A	Q55: A

Q6: C	Q16: C	Q26: A	Q36: C	Q46: A	Q56: A
Q7: B	Q17: C	Q27: D	Q37: A	Q47: A	Q57: D
Q8: D	Q18: D	Q28: B	Q38: C	Q48: C	Q58: B
Q9: A	Q19: A	Q29: A	Q39: C	Q49: C	Q59: A
Q10: B	Q20: A	Q30: B	Q40: C	Q50: B	Q60: C

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