

AP Physics 1 Practice Test 17

60 original multiple-choice questions covering all 8 AP Physics 1 units. 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 1: Kinematics

Q1. A cyclist covers a distance of 350 m in 25 s on a straight road. What is the cyclist's average speed?

- (A) 8750 m/s
- (B) 0.07 m/s
- (C) 14 m/s
- (D) 7 m/s

Q2. A delivery scooter starts from a velocity of 5 m/s and accelerates uniformly at 3 m/s^2 for 5 s. What is its final velocity? (Ignore air resistance.)

- (A) 8 m/s
- (B) 15 m/s
- (C) 35 m/s
- (D) 20 m/s

Q3. A small ball is dropped from rest from a tall tower. Ignoring air resistance, how far does it fall in the first 3 s?

- (A) 44.1 m
- (B) 22.05 m
- (C) 88.2 m
- (D) 66.15 m

Q4. A stone is dropped from rest from a bridge 44.1 m above a river. Ignoring air resistance, how long does it take to reach the water?

- (A) 4 s
- (B) 3 s
- (C) 6 s
- (D) 1.5 s

Q5. A train increases its speed by 24 m/s in 5 s with constant acceleration. What is the magnitude of its acceleration?

- (A) 120 m/s^2
- (B) 2.4 m/s^2
- (C) 4.8 m/s^2
- (D) 24 m/s^2

Q6. A kart starts from rest and accelerates uniformly at 2.5 m/s^2 . How far does it travel in 4 s?

- (A) 10 m
- (B) 40 m
- (C) 30 m
- (D) 20 m

Q7. A car travelling at 22 m/s brakes with a constant deceleration of 5 m/s^2 on a dry road. What is its stopping distance?

- (A) 48.4 m
- (B) 96.8 m
- (C) 4.4 m
- (D) 24.2 m

Unit 2: Force and Translational Dynamics

Q8. A net force acts on a 7 kg toolbox and gives it an acceleration of 3 m/s^2 across a smooth floor. What is the magnitude of the net force?

- (A) 10 N
- (B) 21 N
- (C) 42 N
- (D) 2.33 N

Q9. What is the weight of a 16 kg suitcase on Earth?

- (A) 16 N
- (B) 160 N
- (C) 156.8 N
- (D) 78.4 N

Q10. A crate on a horizontal floor experiences a normal force of 150 N. If the coefficient of kinetic friction is 0.25, what is the magnitude of the kinetic friction force?

- (A) 0.25 N
- (B) 150 N
- (C) 75 N
- (D) 37.5 N

Q11. A 10 kg wagon is pulled to the right with a 70 N force while a 20 N friction force acts to the left. What is the wagon's acceleration?

- (A) 5 m/s^2 to the right
- (B) 9 m/s^2 to the right
- (C) 7 m/s^2 to the right
- (D) 5 m/s^2 to the left

Q12. A 10 kg parcel sits on a frictionless ramp inclined at 30° to the horizontal. Using $\sin 30^\circ = 0.5$, what is the component of the parcel's weight down the ramp?

- (A) 98 N
- (B) 49 N
- (C) 73.5 N
- (D) 24.5 N

Q13. Two masses of 6 kg and 4 kg hang from opposite ends of a light string over a frictionless pulley. What is the magnitude of their acceleration? (Ignore the mass of the pulley.)

- (A) 9.8 m/s^2
- (B) 5.88 m/s^2
- (C) 1.96 m/s^2
- (D) 3.92 m/s^2

Q14. A spring with spring constant 250 N/m is stretched 0.12 m from equilibrium. What is the magnitude of the spring force?

- (A) 2083.33 N
- (B) 250.12 N
- (C) 60 N
- (D) 30 N

Q15. A 65 kg student stands on a bathroom scale in a lift that accelerates upward at 2 m/s^2 . What does the scale read, in newtons?

- (A) 767 N
- (B) 637 N
- (C) 507 N
- (D) 130 N

Unit 3: Work, Energy, and Power

Q16. A gardener pushes a wheelbarrow with a constant horizontal force of 60 N through a distance of 12 m. How much work is done by the push?

- (A) 72 J
- (B) 720 J
- (C) 5 J
- (D) 1440 J

Q17. What is the kinetic energy of a 3 kg medicine ball moving at 10 m/s?

- (A) 30 J
- (B) 300 J
- (C) 150 J
- (D) 75 J

Q18. A 6 kg box is raised 10 m above the ground at constant speed. By how much does its gravitational potential energy increase?

- (A) 60 J
- (B) 58.8 J
- (C) 294 J
- (D) 588 J

Q19. A crane does 1400 J of work in 20 s while lifting a load. What is its average power output?

- (A) 70 W
- (B) 28000 W
- (C) 700 W
- (D) 140 W

Q20. A diver drops from rest from a platform 20 m above the water. Ignoring air resistance, what is the diver's speed just before hitting the water?

- (A) 196 m/s
- (B) 19.8 m/s
- (C) 14 m/s
- (D) 9.9 m/s

Q21. A spring with spring constant 250 N/m is compressed 0.2 m from equilibrium. How much elastic potential energy is stored in the spring?

- (A) 50 J
- (B) 10 J
- (C) 5 J
- (D) 7.5 J

Q22. A motor lifts a 25 kg crate 5 m in 10 s at constant speed. What is the average power output of the motor?

- (A) 1225 W
- (B) 12250 W
- (C) 61.25 W
- (D) 122.5 W

Unit 4: Linear Momentum

Q23. What is the magnitude of the momentum of a 4 kg bowling ball rolling at 12 m/s?

- (A) 48 kg·m/s
- (B) 16 kg·m/s
- (C) 576 kg·m/s
- (D) 24 kg·m/s

Q24. A constant force of 50 N acts on a hockey puck for 3 s. What is the impulse delivered to the puck?

- (A) 16.67 N·s
- (B) 150 N·s
- (C) 53 N·s
- (D) 300 N·s

Q25. A 5 kg trolley moving at 6 m/s collides with a stationary 2 kg trolley and the two stick together. What is their common velocity after the collision? (Ignore friction.)

- (A) 6 m/s
- (B) 15 m/s
- (C) 4.29 m/s
- (D) 8.57 m/s

Q26. An astronaut of mass 65 kg, floating at rest in space, throws a 2 kg tool away at 10 m/s. What is the astronaut's recoil speed? (Ignore external forces.)

- (A) 10 m/s
- (B) 325 m/s
- (C) 0.62 m/s
- (D) 0.31 m/s

Q27. A 1.5 kg squash ball travelling at 5 m/s hits a wall and rebounds at 5 m/s in the opposite direction. What is the magnitude of the change in the ball's momentum?

- (A) 15 kg·m/s
- (B) 7.5 kg·m/s
- (C) 0 kg·m/s
- (D) 22.5 kg·m/s

Q28. A footballer's foot changes a ball's momentum by 150 kg·m/s during a contact lasting 4 s. What is the average force exerted on the ball?

- (A) 600 N
- (B) 37.5 N
- (C) 150 N
- (D) 18.75 N

Q29. Two bumper cars move in the same direction and stick together on collision. The first has mass 3 kg and velocity 6 m/s; the second has mass 2 kg and velocity 4 m/s. What is their velocity after the collision? (Ignore friction.)

- (A) 5 m/s
- (B) 6 m/s
- (C) 5.2 m/s
- (D) 10.4 m/s

Q30. Two skaters glide in the same direction. One has mass 3 kg and velocity 3 m/s; the other has mass 4 kg and velocity 2 m/s. What is the total momentum of the pair?

- (A) 9 kg·m/s
- (B) 8 kg·m/s
- (C) 22 kg·m/s
- (D) 17 kg·m/s

Unit 5: Torque and Rotational Dynamics

Q31. A wrench handle is 0.5 m long. A force of 50 N is applied at right angles to the handle at its end. What is the magnitude of the torque about the nut?

- (A) 25 N·m
- (B) 100 N·m
- (C) 50.5 N·m
- (D) 50 N·m

Q32. What is the moment of inertia of a 3 kg point mass at a distance of 0.5 m from an axis of rotation?

- (A) 1.5 kg·m²
- (B) 0.75 kg·m²
- (C) 3 kg·m²
- (D) 2.25 kg·m²

Q33. A net torque of $18 \text{ N}\cdot\text{m}$ acts on a wheel with moment of inertia $3 \text{ kg}\cdot\text{m}^2$. What is the wheel's angular acceleration?

- (A) 54 rad/s^2
- (B) 0.17 rad/s^2
- (C) 6 rad/s^2
- (D) 3 rad/s^2

Q34. A spinning top has an initial angular velocity of 3 rad/s and a constant angular acceleration of 3 rad/s^2 . What is its angular velocity after 4 s ?

- (A) 6 rad/s
- (B) 12 rad/s
- (C) 30 rad/s
- (D) 15 rad/s

Q35. A uniform plank is balanced on a pivot. A weight of 120 N sits 0.5 m to the left of the pivot. What downward force must be applied 2 m to the right of the pivot to keep the plank balanced?

- (A) 30 N
- (B) 120 N
- (C) 480 N
- (D) 60 N

Q36. A merry-go-round starts with an angular velocity of 2 rad/s and accelerates uniformly at 2 rad/s^2 . Through what angle does it rotate in 4 s ?

- (A) 8 rad
- (B) 24 rad
- (C) 16 rad
- (D) 48 rad

Q37. Two torques act on a door about its hinges: $40 \text{ N}\cdot\text{m}$ clockwise and $10 \text{ N}\cdot\text{m}$ anticlockwise. What is the net torque?

- (A) $50 \text{ N}\cdot\text{m}$ clockwise
- (B) $30 \text{ N}\cdot\text{m}$ anticlockwise
- (C) $30 \text{ N}\cdot\text{m}$ clockwise
- (D) $10 \text{ N}\cdot\text{m}$ clockwise

Unit 6: Energy and Momentum of Rotating Systems

Q38. A flywheel has moment of inertia $3 \text{ kg}\cdot\text{m}^2$ and rotates at 4 rad/s . What is its rotational kinetic energy?

- (A) 12 J
- (B) 48 J
- (C) 36 J
- (D) 24 J

Q39. A spinning disc has moment of inertia $4 \text{ kg}\cdot\text{m}^2$ and angular velocity 2 rad/s . What is its angular momentum?

- (A) $8 \text{ kg}\cdot\text{m}^2/\text{s}$
- (B) $6 \text{ kg}\cdot\text{m}^2/\text{s}$
- (C) $2 \text{ kg}\cdot\text{m}^2/\text{s}$
- (D) $16 \text{ kg}\cdot\text{m}^2/\text{s}$

Q40. An ice skater spins with moment of inertia $4 \text{ kg}\cdot\text{m}^2$ at 4 rad/s . She pulls her arms in, reducing her moment of inertia to $2 \text{ kg}\cdot\text{m}^2$. What is her new angular velocity? (Ignore external torques.)

- (A) 4 rad/s
- (B) 8 rad/s
- (C) 2 rad/s
- (D) 16 rad/s

Q41. A hoop of mass 3 kg rolls without slipping at 3 m/s . Its moment of inertia about its centre is mr^2 . What is its total kinetic energy?

- (A) 13.5 J
- (B) 9 J
- (C) 27 J
- (D) 54 J

Q42. A constant torque of $15 \text{ N}\cdot\text{m}$ rotates a shaft through an angle of 4 rad . How much work is done by the torque?

- (A) 3.75 J
- (B) 19 J
- (C) 120 J
- (D) 60 J

Q43. A solid disc of mass 4 kg and radius 0.5 m rotates at 12 rad/s . Its moment of inertia is $0.5mr^2$. What is its rotational kinetic energy?

- (A) 36 J
- (B) 6 J
- (C) 72 J
- (D) 18 J

Q44. A 2 kg particle moves at 6 m/s at a perpendicular distance of 0.4 m from a fixed point. What is its angular momentum about that point?

- (A) $12 \text{ kg}\cdot\text{m}^2/\text{s}$
- (B) $4.8 \text{ kg}\cdot\text{m}^2/\text{s}$
- (C) $0.8 \text{ kg}\cdot\text{m}^2/\text{s}$
- (D) $9.6 \text{ kg}\cdot\text{m}^2/\text{s}$

Q45. A turbine wheel with moment of inertia $6 \text{ kg}\cdot\text{m}^2$ speeds up from 2 rad/s to 7 rad/s . By how much does its rotational kinetic energy increase?

- (A) 147 J
- (B) 12 J
- (C) 135 J
- (D) 270 J

Unit 7: Oscillations

Q46. A mass of 9 kg hangs from a spring of spring constant 100 N/m and oscillates vertically. Using $\pi = 3.14$, what is the period of oscillation?

- (A) 20.93 s
- (B) 0.94 s
- (C) 3.77 s
- (D) 1.88 s

Q47. A simple pendulum has length 2.45 m. Using $\pi = 3.14$ and $g = 9.8 \text{ m/s}^2$, what is its period for small oscillations?

- (A) 3.14 s
- (B) 9.83 s
- (C) 1.57 s
- (D) 6.28 s

Q48. A vibrating string completes 25 oscillations in 10 s. What is its frequency?

- (A) 0.4 Hz
- (B) 2.5 Hz
- (C) 250 Hz
- (D) 5 Hz

Q49. A mass on a spring oscillates with amplitude 0.25 m and angular frequency 5 rad/s. What is its maximum speed?

- (A) 20 m/s
- (B) 0.31 m/s
- (C) 1.25 m/s
- (D) 2.5 m/s

Q50. A spring of spring constant 200 N/m oscillates with amplitude 0.15 m. What is the total mechanical energy of the oscillation?

- (A) 30 J
- (B) 4.5 J
- (C) 3.38 J
- (D) 2.25 J

Q51. A mass-spring system has a period of 1.5 s. If the mass is quadrupled while the spring constant stays the same, what is the new period?

- (A) 3 s
- (B) 1.5 s
- (C) 6 s
- (D) 0.75 s

Q52. A particle in simple harmonic motion has angular frequency 4 rad/s and amplitude 0.3 m. What is its maximum acceleration?

- (A) 1.2 m/s^2
- (B) 4.8 m/s^2
- (C) 16 m/s^2
- (D) 9.6 m/s^2

Unit 8: Fluids

Q53. A metal block has mass 50 kg and volume 0.02 m^3 . What is its density?

- (A) 1 kg/m^3
- (B) 0 kg/m^3
- (C) 2500 kg/m^3
- (D) 1250 kg/m^3

- Q54. A force of 250 N acts uniformly over an area of 0.5 m^2 . What is the pressure?**
- (A) 125 Pa
 - (B) 250.5 Pa
 - (C) 1000 Pa
 - (D) 500 Pa
- Q55. What is the gauge pressure due to water at a depth of 3 m below the surface? (Density of water = 1000 kg/m^3 , $g = 9.8 \text{ m/s}^2$.)**
- (A) 29400 Pa
 - (B) 3000 Pa
 - (C) 29.4 Pa
 - (D) 14700 Pa
- Q56. A block displaces 0.02 m^3 of water when fully submerged. What is the buoyant force on it? (Density of water = 1000 kg/m^3 .)**
- (A) 20 N
 - (B) 196 N
 - (C) 0.2 N
 - (D) 392 N
- Q57. Water flows through a pipe of cross-sectional area 0.04 m^2 at 2 m/s, then enters a narrower or wider section of area 0.02 m^2 . What is the water speed in the second section?**
- (A) 2 m/s
 - (B) 6 m/s
 - (C) 4 m/s
 - (D) 7 m/s
- Q58. Water flows through a hose of cross-sectional area 0.02 m^2 at 4 m/s. What is the volume flow rate?**
- (A) $200 \text{ m}^3/\text{s}$
 - (B) $4.02 \text{ m}^3/\text{s}$
 - (C) $0.16 \text{ m}^3/\text{s}$
 - (D) $0.08 \text{ m}^3/\text{s}$
- Q59. In a horizontal pipe, water speeds up from 2 m/s to 5 m/s. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)**
- (A) 10500 Pa
 - (B) 3000 Pa
 - (C) 5250 Pa
 - (D) 21000 Pa
- Q60. A wooden block of density 300 kg/m^3 floats in water of density 1000 kg/m^3 . What percentage of the block's volume is submerged?**
- (A) 40%
 - (B) 30%
 - (C) 15%
 - (D) 60%

Answer Key

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

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