

AP Physics 1 Practice Test 20

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 500 m in 25 s on a straight road. What is the cyclist's average speed?

- (A) 12500 m/s
- (B) 20 m/s
- (C) 0.05 m/s
- (D) 10 m/s

Q2. A delivery scooter starts from a velocity of 8 m/s and accelerates uniformly at 3 m/s^2 for 5 s. What is its final velocity? (Ignore air resistance.)

- (A) 11 m/s
- (B) 15 m/s
- (C) 23 m/s
- (D) 38 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 6 s?

- (A) 88.2 m
- (B) 352.8 m
- (C) 264.6 m
- (D) 176.4 m

Q4. A stone is dropped from rest from a bridge 176.4 m above a river. Ignoring air resistance, how long does it take to reach the water?

- (A) 6 s
- (B) 7 s
- (C) 12 s
- (D) 3 s

Q5. A train increases its speed by 36 m/s in 5 s with constant acceleration. What is the magnitude of its acceleration?

- (A) 180 m/s^2
- (B) 7.2 m/s^2
- (C) 3.6 m/s^2
- (D) 36 m/s^2

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

- (A) 16 m
- (B) 64 m
- (C) 32 m
- (D) 48 m

Q7. A car travelling at 28 m/s brakes with a constant deceleration of 5 m/s^2 on a dry road. What is its stopping distance?

- (A) 156.8 m
- (B) 5.6 m
- (C) 39.2 m
- (D) 78.4 m

Unit 2: Force and Translational Dynamics

Q8. A net force acts on a 10 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) 30 N
- (B) 13 N
- (C) 60 N
- (D) 3.33 N

Q9. What is the weight of a 28 kg suitcase on Earth?

- (A) 28 N
- (B) 274.4 N
- (C) 280 N
- (D) 137.2 N

Q10. A crate on a horizontal floor experiences a normal force of 300 N. If the coefficient of kinetic friction is 0.4, what is the magnitude of the kinetic friction force?

- (A) 0.4 N
- (B) 300 N
- (C) 120 N
- (D) 240 N

Q11. A 10 kg wagon is pulled to the right with a 100 N force while a 20 N friction force acts to the left. What is the wagon's acceleration?

- (A) 12 m/s^2 to the right
- (B) 10 m/s^2 to the right
- (C) 8 m/s^2 to the left
- (D) 8 m/s^2 to the right

Q12. A 16 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) 78.4 N
- (B) 156.8 N
- (C) 117.6 N
- (D) 39.2 N

Q13. Two masses of 9 kg and 5 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) 2.8 m/s^2
- (C) 6.3 m/s^2
- (D) 5.6 m/s^2

Q14. A spring with spring constant 400 N/m is stretched 0.18 m from equilibrium. What is the magnitude of the spring force?

- (A) 2222.22 N
- (B) 400.18 N
- (C) 72 N
- (D) 144 N

Q15. A 80 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) 784 N
- (B) 624 N
- (C) 160 N
- (D) 944 N

Unit 3: Work, Energy, and Power

Q16. A gardener pushes a wheelbarrow with a constant horizontal force of 90 N through a distance of 12 m. How much work is done by the push?

- (A) 1080 J
- (B) 102 J
- (C) 7.5 J
- (D) 2160 J

Q17. What is the kinetic energy of a 6 kg medicine ball moving at 10 m/s?

- (A) 60 J
- (B) 300 J
- (C) 600 J
- (D) 150 J

Q18. A 9 kg box is raised 10 m above the ground at constant speed. By how much does its gravitational potential energy increase?

- (A) 90 J
- (B) 88.2 J
- (C) 882 J
- (D) 441 J

Q19. A crane does 2000 J of work in 20 s while lifting a load. What is its average power output?

- (A) 40000 W
- (B) 1000 W
- (C) 200 W
- (D) 100 W

Q20. A diver drops from rest from a platform 50 m above the water. Ignoring air resistance, what is the diver's speed just before hitting the water?

- (A) 31.3 m/s
- (B) 490 m/s
- (C) 22.14 m/s
- (D) 15.65 m/s

Q21. A spring with spring constant 400 N/m is compressed 0.2 m from equilibrium. How much elastic potential energy is stored in the spring?

- (A) 80 J
- (B) 8 J
- (C) 16 J
- (D) 12 J

Q22. A motor lifts a 40 kg crate 5 m in 10 s at constant speed. What is the average power output of the motor?

- (A) 1960 W
- (B) 19600 W
- (C) 196 W
- (D) 98 W

Unit 4: Linear Momentum

Q23. What is the magnitude of the momentum of a 7 kg bowling ball rolling at 12 m/s?

- (A) 19 kg·m/s
- (B) 1008 kg·m/s
- (C) 42 kg·m/s
- (D) 84 kg·m/s

Q24. A constant force of 80 N acts on a hockey puck for 3 s. What is the impulse delivered to the puck?

- (A) 240 N·s
- (B) 26.67 N·s
- (C) 83 N·s
- (D) 480 N·s

Q25. A 8 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) 4.8 m/s
- (C) 24 m/s
- (D) 9.6 m/s

Q26. An astronaut of mass 80 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) 400 m/s
- (C) 0.25 m/s
- (D) 0.5 m/s

Q27. A 3 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) 0 kg·m/s
- (C) 45 kg·m/s
- (D) 30 kg·m/s

Q28. A footballer's foot changes a ball's momentum by $240 \text{ kg}\cdot\text{m/s}$ during a contact lasting 4 s. What is the average force exerted on the ball?

- (A) 60 N
- (B) 960 N
- (C) 240 N
- (D) 30 N

Q29. Two bumper cars move in the same direction and stick together on collision. The first has mass 3 kg and velocity 10 m/s; the second has mass 2 kg and velocity 5 m/s. What is their velocity after the collision? (Ignore friction.)

- (A) 7.5 m/s
- (B) 8 m/s
- (C) 10 m/s
- (D) 16 m/s

Q30. Two skaters glide in the same direction. One has mass 6 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) $18 \text{ kg}\cdot\text{m/s}$
- (B) $8 \text{ kg}\cdot\text{m/s}$
- (C) $26 \text{ kg}\cdot\text{m/s}$
- (D) $31 \text{ kg}\cdot\text{m/s}$

Unit 5: Torque and Rotational Dynamics

Q31. A wrench handle is 0.8 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) $62.5 \text{ N}\cdot\text{m}$
- (B) $50.8 \text{ N}\cdot\text{m}$
- (C) $80 \text{ N}\cdot\text{m}$
- (D) $40 \text{ N}\cdot\text{m}$

Q32. What is the moment of inertia of a 6 kg point mass at a distance of 0.5 m from an axis of rotation?

- (A) $1.5 \text{ kg}\cdot\text{m}^2$
- (B) $3 \text{ kg}\cdot\text{m}^2$
- (C) $6 \text{ kg}\cdot\text{m}^2$
- (D) $4.5 \text{ kg}\cdot\text{m}^2$

Q33. A net torque of $36 \text{ N}\cdot\text{m}$ acts on a wheel with moment of inertia $3 \text{ kg}\cdot\text{m}^2$. What is the wheel's angular acceleration?

- (A) 108 rad/s^2
- (B) 12 rad/s^2
- (C) 0.08 rad/s^2
- (D) 6 rad/s^2

Q34. A spinning top has an initial angular velocity of 6 rad/s and a constant angular acceleration of 3 rad/s². What is its angular velocity after 4 s?

- (A) 9 rad/s
- (B) 12 rad/s
- (C) 18 rad/s
- (D) 36 rad/s

Q35. A uniform plank is balanced on a pivot. A weight of 180 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) 180 N
- (B) 720 N
- (C) 90 N
- (D) 45 N

Q36. A merry-go-round starts with an angular velocity of 2 rad/s and accelerates uniformly at 2 rad/s². Through what angle does it rotate in 7 s?

- (A) 63 rad
- (B) 14 rad
- (C) 49 rad
- (D) 126 rad

Q37. Two torques act on a door about its hinges: 70 N·m clockwise and 10 N·m anticlockwise. What is the net torque?

- (A) 80 N·m clockwise
- (B) 60 N·m clockwise
- (C) 60 N·m anticlockwise
- (D) 10 N·m clockwise

Unit 6: Energy and Momentum of Rotating Systems

Q38. A flywheel has moment of inertia 6 kg·m² and rotates at 4 rad/s. What is its rotational kinetic energy?

- (A) 24 J
- (B) 96 J
- (C) 48 J
- (D) 72 J

Q39. A spinning disc has moment of inertia 7 kg·m² and angular velocity 2 rad/s. What is its angular momentum?

- (A) 9 kg·m²/s
- (B) 3.5 kg·m²/s
- (C) 28 kg·m²/s
- (D) 14 kg·m²/s

Q40. An ice skater spins with moment of inertia $4 \text{ kg}\cdot\text{m}^2$ at 7 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) 14 rad/s
- (B) 7 rad/s
- (C) 3.5 rad/s
- (D) 28 rad/s

Q41. A hoop of mass 6 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) 27 J
- (B) 54 J
- (C) 18 J
- (D) 108 J

Q42. A constant torque of $30 \text{ N}\cdot\text{m}$ rotates a shaft through an angle of 4 rad . How much work is done by the torque?

- (A) 7.5 J
- (B) 34 J
- (C) 120 J
- (D) 240 J

Q43. A solid disc of mass 4 kg and radius 0.5 m rotates at 18 rad/s . Its moment of inertia is $0.5mr^2$. What is its rotational kinetic energy?

- (A) 9 J
- (B) 162 J
- (C) 40.5 J
- (D) 81 J

Q44. A 2 kg particle moves at 9 m/s at a perpendicular distance of 0.4 m from a fixed point. What is its angular momentum about that point?

- (A) $7.2 \text{ kg}\cdot\text{m}^2/\text{s}$
- (B) $18 \text{ kg}\cdot\text{m}^2/\text{s}$
- (C) $0.8 \text{ kg}\cdot\text{m}^2/\text{s}$
- (D) $14.4 \text{ kg}\cdot\text{m}^2/\text{s}$

Q45. A turbine wheel with moment of inertia $6 \text{ kg}\cdot\text{m}^2$ speeds up from 2 rad/s to 10 rad/s . By how much does its rotational kinetic energy increase?

- (A) 300 J
- (B) 288 J
- (C) 12 J
- (D) 576 J

Unit 7: Oscillations

Q46. A mass of 36 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) 10.47 s
- (B) 1.88 s
- (C) 3.77 s
- (D) 7.54 s

Q47. A simple pendulum has length 15.31 m. Using $\pi = 3.14$ and $g = 9.8 \text{ m/s}^2$, what is its period for small oscillations?

- (A) 24.57 s
- (B) 3.93 s
- (C) 15.7 s
- (D) 7.85 s

Q48. A vibrating string completes 40 oscillations in 10 s. What is its frequency?

- (A) 4 Hz
- (B) 0.25 Hz
- (C) 400 Hz
- (D) 8 Hz

Q49. A mass on a spring oscillates with amplitude 0.4 m and angular frequency 5 rad/s. What is its maximum speed?

- (A) 12.5 m/s
- (B) 2 m/s
- (C) 0.8 m/s
- (D) 4 m/s

Q50. A spring of spring constant 200 N/m oscillates with amplitude 0.3 m. What is the total mechanical energy of the oscillation?

- (A) 60 J
- (B) 18 J
- (C) 9 J
- (D) 13.5 J

Q51. A mass-spring system has a period of 3 s. If the mass is quadrupled while the spring constant stays the same, what is the new period?

- (A) 3 s
- (B) 12 s
- (C) 1.5 s
- (D) 6 s

Q52. A particle in simple harmonic motion has angular frequency 4 rad/s and amplitude 0.45 m. What is its maximum acceleration?

- (A) 7.2 m/s^2
- (B) 1.8 m/s^2
- (C) 16 m/s^2
- (D) 14.4 m/s^2

Unit 8: Fluids

Q53. A metal block has mass 80 kg and volume 0.02 m^3 . What is its density?

- (A) 1.6 kg/m^3
- (B) 4000 kg/m^3
- (C) 0 kg/m^3
- (D) 2000 kg/m^3

- Q54. A force of 400 N acts uniformly over an area of 0.5 m^2 . What is the pressure?**
- (A) 200 Pa
 - (B) 400.5 Pa
 - (C) 800 Pa
 - (D) 1600 Pa
- Q55. What is the gauge pressure due to water at a depth of 6 m below the surface? (Density of water = 1000 kg/m^3 , $g = 9.8 \text{ m/s}^2$.)**
- (A) 6000 Pa
 - (B) 58.8 Pa
 - (C) 29400 Pa
 - (D) 58800 Pa
- Q56. A block displaces 0.05 m^3 of water when fully submerged. What is the buoyant force on it? (Density of water = 1000 kg/m^3 .)**
- (A) 490 N
 - (B) 50 N
 - (C) 0.49 N
 - (D) 980 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 0.08 m^2 . What is the water speed in the second section?**
- (A) 0.5 m/s
 - (B) 1 m/s
 - (C) 1.5 m/s
 - (D) 4 m/s
- Q58. Water flows through a hose of cross-sectional area 0.02 m^2 at 7 m/s. What is the volume flow rate?**
- (A) $350 \text{ m}^3/\text{s}$
 - (B) $7.02 \text{ m}^3/\text{s}$
 - (C) $0.14 \text{ m}^3/\text{s}$
 - (D) $0.28 \text{ m}^3/\text{s}$
- Q59. In a horizontal pipe, water speeds up from 2 m/s to 8 m/s. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)**
- (A) 6000 Pa
 - (B) 15000 Pa
 - (C) 60000 Pa
 - (D) 30000 Pa
- Q60. A wooden block of density 600 kg/m^3 floats in water of density 1000 kg/m^3 . What percentage of the block's volume is submerged?**
- (A) 60%
 - (B) 70%
 - (C) 30%
 - (D) 120%

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/ap-physics-1-practice-test-20/ — plus 80 free AP Physics practice tests at QuaidianPoint.com.