

AP Physics 1 Practice Test 12

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 delivery van travels 180 m in 12 s at a steady pace. What is the average speed?

- (A) 30 m/s
- (B) 15 m/s
- (C) 7.5 m/s
- (D) 22.5 m/s

Q2. A train starts at 4 m/s and accelerates uniformly at 3 m/s^2 for 5 s. What is its final speed?

- (A) 38 m/s
- (B) 9.5 m/s
- (C) 19 m/s
- (D) 28.5 m/s

Q3. A cart starts at 2 m/s and accelerates at 4 m/s^2 for 4 s. How far does it travel?

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

Q4. A sprinter starts at 6 m/s and accelerates at 2 m/s^2 over a distance of 16 m. What is the final speed?

- (A) 10 m/s
- (B) 20 m/s
- (C) 5 m/s
- (D) 15 m/s

Q5. A ball is dropped from rest from a tall tower. Ignoring air resistance, what is its speed after 3 s?

- (A) 58.8 m/s
- (B) 29.4 m/s
- (C) 14.7 m/s
- (D) 44.1 m/s

Q6. A metal ball is dropped from rest. Ignoring air resistance, how far does it fall in 3 s?

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

Q7. A ball rolls horizontally off a cliff 44.1 m high with a speed of 6 m/s. Ignoring air resistance, how far from the base of the cliff does it land?

- (A) 36 m
- (B) 9 m
- (C) 27 m
- (D) 18 m

Q8. A car travelling at 16 m/s brakes with a constant deceleration of 4 m/s^2 until it stops. What is its stopping distance?

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

Unit 2: Force and Translational Dynamics

Q9. A net force accelerates a 5 kg crate at 4 m/s^2 across a smooth floor. What is the size of the net force?

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

Q10. A 5.0 kg block is pulled across a frictionless horizontal surface by a 20 N force applied at 30° above the horizontal. What is the horizontal acceleration of the block?

- (A) 2.0 m/s^2
- (B) 4.0 m/s^2
- (C) 3.5 m/s^2
- (D) 6.9 m/s^2

Q11. A 20 kg box slides on a horizontal floor where the coefficient of kinetic friction is 0.3. What is the kinetic friction force?

- (A) 117.6 N
- (B) 29.4 N
- (C) 88.2 N
- (D) 58.8 N

Q12. A horizontal force of 100 N pushes a 20 kg sled on a rough surface ($\mu = 0.3$). What is the acceleration of the sled?

- (A) 2.06 m/s^2
- (B) 4.12 m/s^2
- (C) 1.03 m/s^2
- (D) 3.09 m/s^2

Q13. A 20 kg block rests on a frictionless slope inclined at 37° to the horizontal. What is the component of its weight down the slope? ($\sin 37^\circ = 0.6$)

- (A) 235.2 N
- (B) 117.6 N
- (C) 58.8 N
- (D) 176.4 N

Q14. Two masses of 2 kg and 6 kg are joined by a light string over a frictionless pulley. What is the magnitude of their acceleration? (The 6 kg mass is heavier.)

- (A) 9.8 m/s^2
- (B) 2.45 m/s^2
- (C) 4.9 m/s^2
- (D) 7.35 m/s^2

Q15. A 4 kg ball on a string moves in a horizontal circle of radius 4 m at a speed of 8 m/s. What is the centripetal force on the ball?

- (A) 128 N
- (B) 32 N
- (C) 96 N
- (D) 64 N

Unit 3: Work, Energy, and Power

Q16. A worker pushes a crate with a constant horizontal force of 30 N over a distance of 10 m. How much work is done?

- (A) 300 J
- (B) 600 J
- (C) 150 J
- (D) 450 J

Q17. A rope pulls a box with a force of 40 N at 60° above the horizontal while the box moves 20 m. How much work is done by the rope? ($\cos 60^\circ = 0.5$)

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

Q18. What is the kinetic energy of a 2 kg bowling ball moving at 10 m/s?

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

Q19. A 5 kg book is lifted to a shelf 8 m above the floor. By how much does its gravitational potential energy increase?

- (A) 784 J
- (B) 196 J
- (C) 588 J
- (D) 392 J

Q20. A 2 kg cart starts from rest. A net force does work on it until it reaches 8 m/s. How much work was done on the cart?

- (A) 64 J
- (B) 128 J
- (C) 32 J
- (D) 96 J

Q21. A motor does 900 J of work in 15 s. What is its average power output?

- (A) 120 W
- (B) 60 W
- (C) 30 W
- (D) 90 W

Q22. A car engine exerts a constant driving force of 150 N while the car moves at a steady 4 m/s. What power does the engine deliver?

- (A) 1200 W
- (B) 300 W
- (C) 600 W
- (D) 900 W

Q23. A spring of spring constant 100 N/m is compressed by 0.4 m from its natural length. What is its elastic potential energy?

- (A) 16 J
- (B) 4 J
- (C) 12 J
- (D) 8 J

Unit 4: Linear Momentum

Q24. What is the momentum of a 5 kg cart moving at 4 m/s?

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

Q25. A constant force of 60 N acts on a hockey puck for 0.3 s. What impulse does it deliver?

- (A) 36 N s
- (B) 18 N s
- (C) 9 N s
- (D) 27 N s

Q26. A 4 kg ball changes velocity by 5 m/s during a 0.5 s contact with a bat. What is the average force exerted by the bat?

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

Q27. A 3 kg cart moving at 6 m/s hits a stationary 7 kg cart and the two stick together. What is their common speed after the collision? (Ignore friction.)

- (A) 3.6 m/s
- (B) 0.9 m/s
- (C) 2.7 m/s
- (D) 1.8 m/s

Q28. Two skaters at rest on frictionless ice push apart. One skater has mass 60 kg and moves at 1.5 m/s. The other has mass 30 kg. How fast does the other skater move?

- (A) 3 m/s
- (B) 6 m/s
- (C) 1.5 m/s
- (D) 4.5 m/s

Q29. A 0.2 kg rubber ball hits a wall at 8 m/s and rebounds at 8 m/s in the opposite direction. What is the magnitude of the change in its momentum?

- (A) 6.4 kg m/s
- (B) 3.2 kg m/s
- (C) 1.6 kg m/s
- (D) 4.8 kg m/s

Q30. A 0.50 kg ball moving at 8.0 m/s to the east collides head-on with a 1.5 kg ball moving at 4.0 m/s to the west. Taking east as positive, what is the total momentum of the system just before the collision?

- (A) 10 kg m/s east
- (B) 2.0 kg m/s east
- (C) 2.0 kg m/s west
- (D) 10 kg m/s west

Unit 5: Torque and Rotational Dynamics

Q31. A force of 25 N is applied perpendicular to a wrench at a distance of 0.8 m from the pivot. What is the torque about the pivot?

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

Q32. A force of 50 N acts at 37° to a lever arm of length 0.6 m. What is the torque about the pivot? ($\sin 37^\circ = 0.6$)

- (A) 18 N m
- (B) 36 N m
- (C) 9 N m
- (D) 27 N m

Q33. Two forces act on opposite sides of a pivot: 30 N at 0.5 m on one side and 20 N at 0.5 m on the other side, tending to rotate it oppositely. What is the magnitude of the net torque?

- (A) 10 N m
- (B) 5 N m
- (C) 2.5 N m
- (D) 7.5 N m

Q34. A net torque of 20 N m acts on a wheel with moment of inertia 5 kg m². What is its angular acceleration?

- (A) 8 rad/s²
- (B) 2 rad/s²
- (C) 4 rad/s²
- (D) 6 rad/s²

Q35. A flywheel starts with angular velocity 4 rad/s and angular acceleration 2 rad/s². What is its angular velocity after 5 s?

- (A) 28 rad/s
- (B) 7 rad/s
- (C) 21 rad/s
- (D) 14 rad/s

Q36. A disc starts with angular velocity 3 rad/s and angular acceleration 3 rad/s². Through what angle does it rotate in 4 s?

- (A) 36 rad
- (B) 72 rad
- (C) 18 rad
- (D) 54 rad

Q37. A 4 kg point mass is attached at a distance of 0.3 m from an axis. What is its moment of inertia about that axis? (Treat it as a point mass.)

- (A) 0.72 kg m²
- (B) 0.36 kg m²
- (C) 0.18 kg m²
- (D) 0.54 kg m²

Q38. What net torque is needed to give a rotor of moment of inertia 5 kg m² an angular acceleration of 4 rad/s²?

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

Unit 6: Energy and Momentum of Rotating Systems

Q39. A spinning disc has moment of inertia 2 kg m² and angular velocity 10 rad/s. What is its rotational kinetic energy?

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

Q40. A wheel has moment of inertia 6 kg m² and spins at 4 rad/s. What is its angular momentum?

- (A) 24 kg m²/s
- (B) 48 kg m²/s
- (C) 12 kg m²/s
- (D) 36 kg m²/s

Q41. A figure skater spins with moment of inertia 8 kg m^2 at 3 rad/s , then pulls her arms in so her moment of inertia becomes 4 kg m^2 . What is her new angular velocity? (Ignore external torques.)

- (A) 12 rad/s
- (B) 6 rad/s
- (C) 3 rad/s
- (D) 9 rad/s

Q42. A rolling object of mass 2 kg moves at 8 m/s . Its moment of inertia is 1 kg m^2 and its radius is 0.5 m . What is its total kinetic energy?

- (A) 384 J
- (B) 96 J
- (C) 192 J
- (D) 288 J

Q43. A mass of 2 kg falls 5 m , turning a drum of moment of inertia 2 kg m^2 with no slipping and no other energy loss. What is the angular velocity of the drum at the end of the fall?

- (A) 19.8 rad/s
- (B) 4.95 rad/s
- (C) 14.85 rad/s
- (D) 9.9 rad/s

Q44. A 4 kg particle moves at 4 m/s at a perpendicular distance of 2 m from a point. What is its angular momentum about that point?

- (A) $32 \text{ kg m}^2/\text{s}$
- (B) $64 \text{ kg m}^2/\text{s}$
- (C) $16 \text{ kg m}^2/\text{s}$
- (D) $48 \text{ kg m}^2/\text{s}$

Q45. A rotor with moment of inertia 2 kg m^2 speeds up from 3 rad/s to 7 rad/s . How much rotational work is done on it?

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

Unit 7: Oscillations

Q46. A 4 kg mass on a spring of spring constant 100 N/m oscillates on a frictionless surface. What is the period of oscillation?

- (A) 2.51 s
- (B) 0.63 s
- (C) 1.26 s
- (D) 1.88 s

Q47. A pendulum completes one oscillation in 4 s . What is its frequency?

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

Q48. A simple pendulum has length 2.45 m. What is its period for small oscillations? (Ignore air resistance.)

- (A) 3.14 s
- (B) 6.28 s
- (C) 1.57 s
- (D) 4.71 s

Q49. A mass of 4 kg on a spring ($k = 400 \text{ N/m}$) oscillates with amplitude 0.1 m. What is its maximum speed?

- (A) 2 m/s
- (B) 1 m/s
- (C) 0.5 m/s
- (D) 1.5 m/s

Q50. A spring of spring constant 100 N/m oscillates with amplitude 0.2 m. What is the total mechanical energy of the oscillation?

- (A) 4 J
- (B) 1 J
- (C) 2 J
- (D) 3 J

Q51. A pendulum of length 0.25 m has a period of 1 s. If its length is increased to 1 m, what is its new period?

- (A) 4 s
- (B) 1 s
- (C) 3 s
- (D) 2 s

Q52. A 1 kg mass on a spring ($k = 400 \text{ N/m}$) oscillates with amplitude 0.1 m. What is its maximum acceleration?

- (A) 40 m/s^2
- (B) 80 m/s^2
- (C) 20 m/s^2
- (D) 60 m/s^2

Q53. A 1 kg block on a spring of spring constant 100 N/m oscillates on a frictionless surface. What is the frequency of oscillation?

- (A) 3.18 Hz
- (B) 1.59 Hz
- (C) 0.8 Hz
- (D) 2.39 Hz

Unit 8: Fluids

Q54. A block of mass 500 kg has a volume of 0.5 m^3 . What is its density?

- (A) 2000 kg/m^3
- (B) 500 kg/m^3
- (C) 1000 kg/m^3
- (D) 1500 kg/m^3

Q55. A force of 300 N acts on an area of 0.25 m^2 . What pressure does it exert?

- (A) 2400 Pa
- (B) 600 Pa
- (C) 1800 Pa
- (D) 1200 Pa

Q56. What is the gauge pressure due to water at a depth of 10 m below the surface? (Density of water = 1000 kg/m^3 .)

- (A) 98000 Pa
- (B) 196000 Pa
- (C) 49000 Pa
- (D) 147000 Pa

Q57. A solid of volume 0.05 m^3 is fully submerged in water (density 1000 kg/m^3). What is the buoyant force on it?

- (A) 980 N
- (B) 490 N
- (C) 245 N
- (D) 735 N

Q58. Water flows through a pipe of cross-sectional area 0.06 m^2 at 2 m/s, then enters a narrower section of area 0.03 m^2 . What is the speed in the narrower section?

- (A) 8 m/s
- (B) 2 m/s
- (C) 4 m/s
- (D) 6 m/s

Q59. Water flows through a pipe of cross-sectional area 0.05 m^2 at 2 m/s. What is the volume flow rate?

- (A) $0.2 \text{ m}^3/\text{s}$
- (B) $0.05 \text{ m}^3/\text{s}$
- (C) $0.15 \text{ m}^3/\text{s}$
- (D) $0.1 \text{ m}^3/\text{s}$

Q60. Water speeds up from 3 m/s to 5 m/s in a horizontal pipe. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)

- (A) 8000 Pa
- (B) 16000 Pa
- (C) 4000 Pa
- (D) 12000 Pa

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

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