

AP Physics 1 Practice Test 14

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 scooter rider travels 150 m in 6 s at a steady pace. What is the average speed?

- (A) 50 m/s
- (B) 12.5 m/s
- (C) 37.5 m/s
- (D) 25 m/s

Q2. A van starts at 6 m/s and accelerates uniformly at 4 m/s^2 for 3 s. What is its final speed?

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

Q3. A skateboarder starts at 4 m/s and accelerates at 3 m/s^2 for 4 s. How far does it travel?

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

Q4. A sprinter starts at 8 m/s and accelerates at 2 m/s^2 over a distance of 20 m. What is the final speed?

- (A) 24 m/s
- (B) 6 m/s
- (C) 12 m/s
- (D) 18 m/s

Q5. A small rock is dropped from rest from a tall tower. Ignoring air resistance, what is its speed after 2 s?

- (A) 39.2 m/s
- (B) 9.8 m/s
- (C) 29.4 m/s
- (D) 19.6 m/s

Q6. A metal ball is dropped from rest. Ignoring air resistance, how far does it fall in 5 s?

- (A) 122.5 m
- (B) 245 m
- (C) 61.25 m
- (D) 183.75 m

Q7. A ball rolls horizontally off a cliff 44.1 m high with a speed of 10 m/s. Ignoring air resistance, how far from the base of the cliff does it land?

- (A) 60 m
- (B) 30 m
- (C) 15 m
- (D) 45 m

Q8. A car travelling at 10 m/s brakes with a constant deceleration of 2 m/s^2 until it stops. What is its stopping distance?

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

Unit 2: Force and Translational Dynamics

Q9. A net force accelerates a 8 kg crate at 3 m/s^2 across a smooth floor. What is the size of the net force?

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

Q10. A car of mass 1200 kg accelerates from rest to 20 m/s in 8.0 s on a level road. What is the average net force on the car?

- (A) 3000 N
- (B) 960 N
- (C) 1500 N
- (D) 6000 N

Q11. A 25 kg box slides on a horizontal floor where the coefficient of kinetic friction is 0.2. What is the kinetic friction force?

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

Q12. A horizontal force of 60 N pushes a 8 kg sled on a rough surface ($\mu = 0.25$). What is the acceleration of the sled?

- (A) 10.1 m/s^2
- (B) 2.52 m/s^2
- (C) 5.05 m/s^2
- (D) 7.57 m/s^2

Q13. A 12 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) 141.12 N
- (B) 35.28 N
- (C) 105.84 N
- (D) 70.56 N

Q14. Two masses of 5 kg and 7 kg are joined by a light string over a frictionless pulley. What is the magnitude of their acceleration? (The 7 kg mass is heavier.)

- (A) 1.63 m/s^2
- (B) 3.27 m/s^2
- (C) 0.82 m/s^2
- (D) 2.45 m/s^2

Q15. A 3 kg ball on a string moves in a horizontal circle of radius 3 m at a speed of 9 m/s. What is the centripetal force on the ball?

- (A) 162 N
- (B) 81 N
- (C) 40.5 N
- (D) 121.5 N

Unit 3: Work, Energy, and Power

Q16. A worker pushes a crate with a constant horizontal force of 40 N over a distance of 8 m. How much work is done?

- (A) 640 J
- (B) 160 J
- (C) 320 J
- (D) 480 J

Q17. A rope pulls a box with a force of 60 N at 60° above the horizontal while the box moves 15 m. How much work is done by the rope? ($\cos 60^\circ = 0.5$)

- (A) 900 J
- (B) 225 J
- (C) 675 J
- (D) 450 J

Q18. What is the kinetic energy of a 5 kg bowling ball moving at 8 m/s?

- (A) 160 J
- (B) 320 J
- (C) 80 J
- (D) 240 J

Q19. A 10 kg book is lifted to a shelf 6 m above the floor. By how much does its gravitational potential energy increase?

- (A) 1176 J
- (B) 588 J
- (C) 294 J
- (D) 882 J

Q20. A 5 kg cart starts from rest. A net force does work on it until it reaches 10 m/s. How much work was done on the cart?

- (A) 500 J
- (B) 125 J
- (C) 250 J
- (D) 375 J

Q21. A motor does 500 J of work in 5 s. What is its average power output?

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

Q22. A car engine exerts a constant driving force of 300 N while the car moves at a steady 2 m/s. What power does the engine deliver?

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

Q23. A spring of spring constant 50 N/m is compressed by 0.6 m from its natural length. What is its elastic potential energy?

- (A) 18 J
- (B) 9 J
- (C) 4.5 J
- (D) 13.5 J

Unit 4: Linear Momentum

Q24. What is the momentum of a 10 kg cart moving at 3 m/s?

- (A) 60 kg m/s
- (B) 15 kg m/s
- (C) 30 kg m/s
- (D) 45 kg m/s

Q25. A constant force of 100 N acts on a hockey puck for 0.2 s. What impulse does it deliver?

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

Q26. A 3 kg ball changes velocity by 8 m/s during a 0.2 s contact with a bat. What is the average force exerted by the bat?

- (A) 120 N
- (B) 240 N
- (C) 60 N
- (D) 180 N

Q27. A 2 kg cart moving at 8 m/s hits a stationary 8 kg cart and the two stick together. What is their common speed after the collision? (Ignore friction.)

- (A) 3.2 m/s
- (B) 1.6 m/s
- (C) 0.8 m/s
- (D) 2.4 m/s

Q28. Two skaters at rest on frictionless ice push apart. One skater has mass 70 kg and moves at 1 m/s. The other has mass 35 kg. How fast does the other skater move?

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

Q29. A 1 kg rubber ball hits a wall at 4 m/s and rebounds at 4 m/s in the opposite direction. What is the magnitude of the change in its momentum?

- (A) 16 kg m/s
- (B) 4 kg m/s
- (C) 12 kg m/s
- (D) 8 kg m/s

Q30. A 0.20 kg tennis ball moving at 25 m/s is stopped by a racket in 0.050 s. What is the average force exerted by the racket on the ball?

- (A) 100 N
- (B) 25 N
- (C) 250 N
- (D) 500 N

Unit 5: Torque and Rotational Dynamics

Q31. A force of 10 N is applied perpendicular to a wrench at a distance of 1.2 m from the pivot. What is the torque about the pivot?

- (A) 24 N m
- (B) 12 N m
- (C) 6 N m
- (D) 18 N m

Q32. A force of 60 N acts at 37° to a lever arm of length 0.4 m. What is the torque about the pivot? ($\sin 37^\circ = 0.6$)

- (A) 28.8 N m
- (B) 7.2 N m
- (C) 14.4 N m
- (D) 21.6 N m

Q33. Two forces act on opposite sides of a pivot: 40 N at 0.3 m on one side and 10 N at 0.6 m on the other side, tending to rotate it oppositely. What is the magnitude of the net torque?

- (A) 12 N m
- (B) 3 N m
- (C) 9 N m
- (D) 6 N m

Q34. A net torque of 24 N m acts on a wheel with moment of inertia 8 kg m^2 . What is its angular acceleration?

- (A) 3 rad/s^2
- (B) 6 rad/s^2
- (C) 1.5 rad/s^2
- (D) 4.5 rad/s^2

Q35. A flywheel starts with angular velocity 3 rad/s and angular acceleration 3 rad/s^2 . What is its angular velocity after 4 s?

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

Q36. A disc starts with angular velocity 4 rad/s and angular acceleration 2 rad/s^2 . Through what angle does it rotate in 3 s?

- (A) 42 rad
- (B) 10.5 rad
- (C) 21 rad
- (D) 31.5 rad

Q37. A 5 kg point mass is attached at a distance of 0.2 m from an axis. What is its moment of inertia about that axis? (Treat it as a point mass.)

- (A) 0.4 kg m^2
- (B) 0.1 kg m^2
- (C) 0.3 kg m^2
- (D) 0.2 kg m^2

Q38. What net torque is needed to give a rotor of moment of inertia 8 kg m^2 an angular acceleration of 3 rad/s^2 ?

- (A) 24 N m
- (B) 48 N m
- (C) 12 N m
- (D) 36 N m

Unit 6: Energy and Momentum of Rotating Systems

Q39. A spinning disc has moment of inertia 8 kg m^2 and angular velocity 3 rad/s . What is its rotational kinetic energy?

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

Q40. A wheel has moment of inertia 5 kg m^2 and spins at 5 rad/s . What is its angular momentum?

- (A) $50 \text{ kg m}^2/\text{s}$
- (B) $12.5 \text{ kg m}^2/\text{s}$
- (C) $25 \text{ kg m}^2/\text{s}$
- (D) $37.5 \text{ kg m}^2/\text{s}$

Q41. A figure skater spins with moment of inertia 4 kg m^2 at 6 rad/s , then pulls her arms in so her moment of inertia becomes 2 kg m^2 . What is her new angular velocity? (Ignore external torques.)

- (A) 24 rad/s
- (B) 6 rad/s
- (C) 18 rad/s
- (D) 12 rad/s

Q42. A rolling object of mass 8 kg moves at 3 m/s . Its moment of inertia is 2 kg m^2 and its radius is 0.4 m . What is its total kinetic energy?

- (A) 92.25 J
- (B) 184.5 J
- (C) 46.12 J
- (D) 138.38 J

Q43. A mass of 3 kg falls 10 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) 34.29 rad/s
- (B) 17.15 rad/s
- (C) 8.57 rad/s
- (D) 25.72 rad/s

Q44. A 3 kg particle moves at 8 m/s at a perpendicular distance of 2 m from a point. What is its angular momentum about that point?

- (A) $96 \text{ kg m}^2/\text{s}$
- (B) $24 \text{ kg m}^2/\text{s}$
- (C) $48 \text{ kg m}^2/\text{s}$
- (D) $72 \text{ kg m}^2/\text{s}$

Q45. A rotor with moment of inertia 8 kg m^2 speeds up from 2 rad/s to 4 rad/s . How much rotational work is done on it?

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

Unit 7: Oscillations

Q46. A 1 kg mass on a spring of spring constant 400 N/m oscillates on a frictionless surface. What is the period of oscillation?

- (A) 0.31 s
- (B) 0.63 s
- (C) 0.16 s
- (D) 0.47 s

Q47. A pendulum completes one oscillation in 5 s . What is its frequency?

- (A) 0.4 Hz
- (B) 0.2 Hz
- (C) 0.1 Hz
- (D) 0.3 Hz

Q48. A simple pendulum has length 3.92 m. What is its period for small oscillations? (Ignore air resistance.)

- (A) 7.95 s
- (B) 1.99 s
- (C) 3.97 s
- (D) 5.96 s

Q49. A mass of 9 kg on a spring ($k = 900 \text{ N/m}$) oscillates with amplitude 0.05 m. What is its maximum speed?

- (A) 1 m/s
- (B) 0.25 m/s
- (C) 0.75 m/s
- (D) 0.5 m/s

Q50. A spring of spring constant 50 N/m oscillates with amplitude 0.4 m. What is the total mechanical energy of the oscillation?

- (A) 4 J
- (B) 8 J
- (C) 2 J
- (D) 6 J

Q51. A pendulum of length 2.25 m has a period of 3 s. If its length is increased to 9 m, what is its new period?

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

Q52. A 4 kg mass on a spring ($k = 900 \text{ N/m}$) oscillates with amplitude 0.05 m. What is its maximum acceleration?

- (A) 22.5 m/s^2
- (B) 5.62 m/s^2
- (C) 11.25 m/s^2
- (D) 16.88 m/s^2

Q53. A 1 kg block on a spring of spring constant 900 N/m oscillates on a frictionless surface. What is the frequency of oscillation?

- (A) 9.55 Hz
- (B) 2.39 Hz
- (C) 7.16 Hz
- (D) 4.77 Hz

Unit 8: Fluids

Q54. A block of mass 100 kg has a volume of 0.25 m^3 . What is its density?

- (A) 400 kg/m^3
- (B) 800 kg/m^3
- (C) 200 kg/m^3
- (D) 600 kg/m^3

Q55. A force of 500 N acts on an area of 1 m^2 . What pressure does it exert?

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

Q56. What is the gauge pressure due to water at a depth of 8 m below the surface? (Density of water = 1000 kg/m^3 .)

- (A) 156800 Pa
- (B) 39200 Pa
- (C) 78400 Pa
- (D) 117600 Pa

Q57. A solid of volume 0.1 m^3 is fully submerged in water (density 1000 kg/m^3). What is the buoyant force on it?

- (A) 1960 N
- (B) 490 N
- (C) 1470 N
- (D) 980 N

Q58. Water flows through a pipe of cross-sectional area 0.08 m^2 at 2.5 m/s, then enters a narrower section of area 0.04 m^2 . What is the speed in the narrower section?

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

Q59. Water flows through a pipe of cross-sectional area 0.01 m^2 at 8 m/s. What is the volume flow rate?

- (A) $0.16 \text{ m}^3/\text{s}$
- (B) $0.08 \text{ m}^3/\text{s}$
- (C) $0.04 \text{ m}^3/\text{s}$
- (D) $0.12 \text{ m}^3/\text{s}$

Q60. Water speeds up from 4 m/s to 6 m/s in a horizontal pipe. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)

- (A) 20000 Pa
- (B) 5000 Pa
- (C) 10000 Pa
- (D) 15000 Pa

Answer Key

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

Q5: D	Q15: B	Q25: D	Q35: B	Q45: D	Q55: B
Q6: A	Q16: C	Q26: A	Q36: C	Q46: A	Q56: C
Q7: B	Q17: D	Q27: B	Q37: D	Q47: B	Q57: D
Q8: C	Q18: A	Q28: C	Q38: A	Q48: C	Q58: A
Q9: D	Q19: B	Q29: D	Q39: B	Q49: D	Q59: B
Q10: A	Q20: C	Q30: A	Q40: C	Q50: A	Q60: C

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