

AP Physics 1 Practice Test 15

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 school bus travels 210 m in 14 s at a steady pace. What is the average speed?

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

Q2. A truck starts at 8 m/s and accelerates uniformly at 3 m/s^2 for 6 s. What is its final speed?

- (A) 52 m/s
- (B) 26 m/s
- (C) 13 m/s
- (D) 39 m/s

Q3. A cyclist starts at 5 m/s and accelerates at 2 m/s^2 for 8 s. How far does it travel?

- (A) 208 m
- (B) 52 m
- (C) 104 m
- (D) 156 m

Q4. A sprinter starts at 5 m/s and accelerates at 4 m/s^2 over a distance of 15 m. What is the final speed?

- (A) 24.08 m/s
- (B) 6.02 m/s
- (C) 18.06 m/s
- (D) 12.04 m/s

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

- (A) 29.4 m/s
- (B) 58.8 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 6 s?

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

Q7. A ball rolls horizontally off a cliff 19.6 m high with a speed of 5 m/s. Ignoring air resistance, how far from the base of the cliff does it land?

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

Q8. A car travelling at 18 m/s brakes with a constant deceleration of 3 m/s^2 until it stops. What is its stopping distance?

- (A) 108 m
- (B) 27 m
- (C) 81 m
- (D) 54 m

Unit 2: Force and Translational Dynamics

Q9. A net force accelerates a 10 kg crate at 2 m/s^2 across a smooth floor. What is the size of the net force?

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

Q10. What is the weight of a 15 kg backpack on Earth?

- (A) 294 N
- (B) 147 N
- (C) 73.5 N
- (D) 220.5 N

Q11. A 15 kg box slides on a horizontal floor where the coefficient of kinetic friction is 0.4. What is the kinetic friction force?

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

Q12. A horizontal force of 90 N pushes a 12 kg sled on a rough surface ($\mu = 0.3$). What is the acceleration of the sled?

- (A) 9.12 m/s^2
- (B) 2.28 m/s^2
- (C) 6.84 m/s^2
- (D) 4.56 m/s^2

Q13. A 16 kg block rests on a frictionless slope inclined at 30° to the horizontal. What is the component of its weight down the slope? ($\sin 30^\circ = 0.5$)

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

Q14. Two masses of 1 kg and 3 kg are joined by a light string over a frictionless pulley. What is the magnitude of their acceleration? (The 3 kg mass is heavier.)

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

Q15. A 5 kg ball on a string moves in a horizontal circle of radius 5 m at a speed of 6 m/s. What is the centripetal force on the ball?

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

Unit 3: Work, Energy, and Power

Q16. A worker pushes a crate with a constant horizontal force of 15 N over a distance of 20 m. How much work is done?

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

Q17. A rope pulls a box with a force of 80 N at 37° above the horizontal while the box moves 10 m. How much work is done by the rope? ($\cos 37^\circ = 0.8$)

- (A) 640 J
- (B) 1280 J
- (C) 320 J
- (D) 960 J

Q18. What is the kinetic energy of a 8 kg bowling ball moving at 3 m/s?

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

Q19. A 3 kg book is lifted to a shelf 20 m above the floor. By how much does its gravitational potential energy increase?

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

Q20. A 10 kg cart starts from rest. A net force does work on it until it reaches 4 m/s. How much work was done on the cart?

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

Q21. A motor does 800 J of work in 16 s. What is its average power output?

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

Q22. A car engine exerts a constant driving force of 250 N while the car moves at a steady 4 m/s. What power does the engine deliver?

- (A) 2000 W
- (B) 1000 W
- (C) 500 W
- (D) 1500 W

Q23. A spring of spring constant 300 N/m is compressed by 0.2 m from its natural length. What is its elastic potential energy?

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

Unit 4: Linear Momentum

Q24. What is the momentum of a 4 kg cart moving at 7 m/s?

- (A) 56 kg m/s
- (B) 14 kg m/s
- (C) 42 kg m/s
- (D) 28 kg m/s

Q25. A constant force of 80 N acts on a hockey puck for 0.4 s. What impulse does it deliver?

- (A) 32 N s
- (B) 64 N s
- (C) 16 N s
- (D) 48 N s

Q26. A 10 kg ball changes velocity by 3 m/s during a 0.6 s contact with a bat. What is the average force exerted by the bat?

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

Q27. A 5 kg cart moving at 6 m/s hits a stationary 5 kg cart and the two stick together. What is their common speed after the collision? (Ignore friction.)

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

Q28. Two skaters at rest on frictionless ice push apart. One skater has mass 55 kg and moves at 2 m/s. The other has mass 22 kg. How fast does the other skater move?

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

Q29. A 0.3 kg rubber ball hits a wall at 10 m/s and rebounds at 10 m/s in the opposite direction. What is the magnitude of the change in its momentum?

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

Q30. A 0.40 kg soccer ball moving at 12 m/s rebounds from a wall at 10 m/s in the opposite direction. What is the magnitude of the impulse delivered by the wall?

- (A) 0.80 N s
- (B) 8.8 N s
- (C) 4.0 N s
- (D) 17.6 N s

Unit 5: Torque and Rotational Dynamics

Q31. A force of 40 N is applied perpendicular to a wrench at a distance of 0.6 m from the pivot. What is the torque about the pivot?

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

Q32. A force of 20 N acts at 30° to a lever arm of length 1.0 m. What is the torque about the pivot? ($\sin 30^\circ = 0.5$)

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

Q33. Two forces act on opposite sides of a pivot: 25 N at 0.4 m on one side and 5 N at 0.8 m on the other side, tending to rotate it oppositely. What is the magnitude of the net torque?

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

Q34. A net torque of 15 N m acts on a wheel with moment of inertia 3 kg m^2 . What is its angular acceleration?

- (A) 10 rad/s^2
- (B) 5 rad/s^2
- (C) 2.5 rad/s^2
- (D) 7.5 rad/s^2

Q35. A flywheel starts with angular velocity 5 rad/s and angular acceleration 2 rad/s^2 . What is its angular velocity after 6 s?

- (A) 34 rad/s
- (B) 8.5 rad/s
- (C) 17 rad/s
- (D) 25.5 rad/s

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

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

Q37. A 1 kg point mass is attached at a distance of 0.8 m from an axis. What is its moment of inertia about that axis? (Treat it as a point mass.)

- (A) 0.64 kg m^2
- (B) 1.28 kg m^2
- (C) 0.32 kg m^2
- (D) 0.96 kg m^2

Q38. What net torque is needed to give a rotor of moment of inertia 3 kg m^2 an angular acceleration of 5 rad/s^2 ?

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

Unit 6: Energy and Momentum of Rotating Systems

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

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

Q40. A wheel has moment of inertia 4 kg m^2 and spins at 7 rad/s . What is its angular momentum?

- (A) $56 \text{ kg m}^2/\text{s}$
- (B) $14 \text{ kg m}^2/\text{s}$
- (C) $42 \text{ kg m}^2/\text{s}$
- (D) $28 \text{ kg m}^2/\text{s}$

- Q41. A figure skater spins with moment of inertia 12 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) 9 rad/s
 - (B) 18 rad/s
 - (C) 4.5 rad/s
 - (D) 13.5 rad/s
- Q42. A rolling object of mass 5 kg moves at 5 m/s . Its moment of inertia is 2 kg m^2 and its radius is 0.5 m . What is its total kinetic energy?**
- (A) 325 J
 - (B) 162.5 J
 - (C) 81.25 J
 - (D) 243.75 J
- Q43. A mass of 4 kg falls 20 m , turning a drum of moment of inertia 4 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) 39.6 rad/s
 - (B) 9.9 rad/s
 - (C) 19.8 rad/s
 - (D) 29.7 rad/s
- Q44. A 5 kg particle moves at 6 m/s at a perpendicular distance of 4 m from a point. What is its angular momentum about that point?**
- (A) $240 \text{ kg m}^2/\text{s}$
 - (B) $60 \text{ kg m}^2/\text{s}$
 - (C) $180 \text{ kg m}^2/\text{s}$
 - (D) $120 \text{ kg m}^2/\text{s}$
- Q45. A rotor with moment of inertia 6 kg m^2 speeds up from 3 rad/s to 5 rad/s . How much rotational work is done on it?**
- (A) 48 J
 - (B) 96 J
 - (C) 24 J
 - (D) 72 J

Unit 7: Oscillations

- Q46. A 16 kg mass on a spring of spring constant 100 N/m oscillates on a frictionless surface. What is the period of oscillation?**
- (A) 5.03 s
 - (B) 2.51 s
 - (C) 1.26 s
 - (D) 3.77 s
- Q47. A pendulum completes one oscillation in 2.5 s . What is its frequency?**
- (A) 0.8 Hz
 - (B) 0.2 Hz
 - (C) 0.4 Hz
 - (D) 0.6 Hz

Q48. A simple pendulum has length 1.225 m. What is its period for small oscillations? (Ignore air resistance.)

- (A) 4.44 s
- (B) 1.11 s
- (C) 3.33 s
- (D) 2.22 s

Q49. A mass of 4 kg on a spring ($k = 100 \text{ N/m}$) oscillates with amplitude 0.4 m. What is its maximum speed?

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

Q50. A spring of spring constant 300 N/m oscillates with amplitude 0.1 m. What is the total mechanical energy of the oscillation?

- (A) 3 J
- (B) 1.5 J
- (C) 0.75 J
- (D) 2.25 J

Q51. A pendulum of length 1.44 m has a period of 2.4 s. If its length is increased to 5.76 m, what is its new period?

- (A) 9.6 s
- (B) 2.4 s
- (C) 4.8 s
- (D) 7.2 s

Q52. A 9 kg mass on a spring ($k = 100 \text{ N/m}$) oscillates with amplitude 0.3 m. What is its maximum acceleration?

- (A) 6.67 m/s^2
- (B) 1.67 m/s^2
- (C) 5 m/s^2
- (D) 3.33 m/s^2

Q53. A 2 kg block on a spring of spring constant 98 N/m oscillates on a frictionless surface. What is the frequency of oscillation?

- (A) 1.11 Hz
- (B) 2.23 Hz
- (C) 0.56 Hz
- (D) 1.67 Hz

Unit 8: Fluids

Q54. A block of mass 800 kg has a volume of 0.4 m^3 . What is its density?

- (A) 4000 kg/m^3
- (B) 2000 kg/m^3
- (C) 1000 kg/m^3
- (D) 3000 kg/m^3

Q55. A force of 150 N acts on an area of 0.3 m^2 . What pressure does it exert?

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

Q56. What is the gauge pressure due to water at a depth of 4 m below the surface? (Density of water = 1000 kg/m^3 .)

- (A) 78400 Pa
- (B) 19600 Pa
- (C) 58800 Pa
- (D) 39200 Pa

Q57. A solid of volume 0.03 m^3 is fully submerged in water (density 1000 kg/m^3). What is the buoyant force on it?

- (A) 294 N
- (B) 588 N
- (C) 147 N
- (D) 441 N

Q58. Water flows through a pipe of cross-sectional area 0.03 m^2 at 6 m/s, then enters a narrower section of area 0.015 m^2 . What is the speed in the narrower section?

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

Q59. Water flows through a pipe of cross-sectional area 0.1 m^2 at 1.5 m/s. What is the volume flow rate?

- (A) $0.3 \text{ m}^3/\text{s}$
- (B) $0.08 \text{ m}^3/\text{s}$
- (C) $0.15 \text{ m}^3/\text{s}$
- (D) $0.23 \text{ m}^3/\text{s}$

Q60. Water speeds up from 2 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) 21000 Pa
- (B) 5250 Pa
- (C) 15750 Pa
- (D) 10500 Pa

Answer Key

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

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

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