

AP Physics 1 Practice Test 13

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 runner travels 240 m in 10 s at a steady pace. What is the average speed?

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

Q2. A motorbike starts at 10 m/s and accelerates uniformly at 2 m/s^2 for 4 s. What is its final speed?

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

Q3. A toy car starts at 6 m/s and accelerates at 2 m/s^2 for 6 s. How far does it travel?

- (A) 72 m
- (B) 144 m
- (C) 36 m
- (D) 108 m

Q4. A sprinter starts at 2 m/s and accelerates at 5 m/s^2 over a distance of 12 m. What is the final speed?

- (A) 22.27 m/s
- (B) 11.14 m/s
- (C) 5.57 m/s
- (D) 16.7 m/s

Q5. A coin is dropped from rest from a tall tower. Ignoring air resistance, what is its speed after 4 s?

- (A) 78.4 m/s
- (B) 19.6 m/s
- (C) 39.2 m/s
- (D) 58.8 m/s

Q6. A metal ball is dropped from rest. Ignoring air resistance, how far does it fall in 4 s?

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

Q7. A ball rolls horizontally off a cliff 19.6 m high with a speed of 12 m/s. Ignoring air resistance, how far from the base of the cliff does it land?

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

Q8. A car travelling at 20 m/s brakes with a constant deceleration of 5 m/s^2 until it stops. What is its stopping distance?

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

Unit 2: Force and Translational Dynamics

Q9. A net force accelerates a 6 kg crate at 2 m/s^2 across a smooth floor. What is the size of the net force?

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

Q10. Two forces act on a 2.0 kg object: 6.0 N east and 8.0 N north. What is the magnitude of the object's acceleration?

- (A) 2.0 m/s^2
- (B) 3.5 m/s^2
- (C) 7.0 m/s^2
- (D) 5.0 m/s^2

Q11. A 5 kg box slides on a horizontal floor where the coefficient of kinetic friction is 0.4. What is the kinetic friction force?

- (A) 19.6 N
- (B) 39.2 N
- (C) 9.8 N
- (D) 29.4 N

Q12. A horizontal force of 30 N pushes a 5 kg sled on a rough surface ($\mu = 0.2$). What is the acceleration of the sled?

- (A) 8.08 m/s^2
- (B) 4.04 m/s^2
- (C) 2.02 m/s^2
- (D) 6.06 m/s^2

Q13. A 8 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) 19.6 N
- (C) 39.2 N
- (D) 58.8 N

Q14. Two masses of 4 kg and 8 kg are joined by a light string over a frictionless pulley. What is the magnitude of their acceleration? (The 8 kg mass is heavier.)

- (A) 6.53 m/s^2
- (B) 1.63 m/s^2
- (C) 4.9 m/s^2
- (D) 3.27 m/s^2

Q15. A 1 kg ball on a string moves in a horizontal circle of radius 5 m at a speed of 10 m/s. What is the centripetal force on the ball?

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

Unit 3: Work, Energy, and Power

Q16. A worker pushes a crate with a constant horizontal force of 25 N over a distance of 12 m. How much work is done?

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

Q17. A rope pulls a box with a force of 100 N at 37° above the horizontal while the box moves 6 m. How much work is done by the rope? ($\cos 37^\circ = 0.8$)

- (A) 960 J
- (B) 240 J
- (C) 480 J
- (D) 720 J

Q18. What is the kinetic energy of a 6 kg bowling ball moving at 4 m/s?

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

Q19. A 4 kg book is lifted to a shelf 15 m above the floor. By how much does its gravitational potential energy increase?

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

Q20. A 8 kg cart starts from rest. A net force does work on it until it reaches 5 m/s. How much work was done on the cart?

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

Q21. A motor does 1200 J of work in 20 s. What is its average power output?

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

Q22. A car engine exerts a constant driving force of 100 N while the car moves at a steady 6 m/s. What power does the engine deliver?

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

Q23. A spring of spring constant 400 N/m is compressed by 0.1 m from its natural length. What is its elastic potential energy?

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

Unit 4: Linear Momentum

Q24. What is the momentum of a 2 kg cart moving at 9 m/s?

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

Q25. A constant force of 25 N acts on a hockey puck for 0.8 s. What impulse does it deliver?

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

Q26. A 5 kg ball changes velocity by 4 m/s during a 0.4 s contact with a bat. What is the average force exerted by the bat?

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

Q27. A 6 kg cart moving at 4 m/s hits a stationary 4 kg cart and the two stick together. What is their common speed after the collision? (Ignore friction.)

- (A) 2.4 m/s
- (B) 4.8 m/s
- (C) 1.2 m/s
- (D) 3.6 m/s

Q28. Two skaters at rest on frictionless ice push apart. One skater has mass 40 kg and moves at 3 m/s. The other has mass 20 kg. How fast does the other skater move?

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

Q29. A 0.4 kg rubber ball hits a wall at 5 m/s and rebounds at 5 m/s in the opposite direction. What is the magnitude of the change in its momentum?

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

Q30. A 70 kg astronaut at rest in space throws a 2.0 kg tool at 15 m/s away from a space station. What is the astronaut's recoil speed?

- (A) 0.029 m/s
- (B) 0.21 m/s
- (C) 0.86 m/s
- (D) 0.43 m/s

Unit 5: Torque and Rotational Dynamics

Q31. A force of 30 N is applied perpendicular to a wrench at a distance of 0.4 m from the pivot. What is the torque about the pivot?

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

Q32. A force of 25 N acts at 30° to a lever arm of length 0.8 m. What is the torque about the pivot? ($\sin 30^\circ = 0.5$)

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

Q33. Two forces act on opposite sides of a pivot: 15 N at 0.8 m on one side and 30 N at 0.2 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) 6 N m
- (D) 9 N m

Q34. A net torque of 18 N m acts on a wheel with moment of inertia 6 kg m². What is its angular acceleration?

- (A) 6 rad/s²
- (B) 1.5 rad/s²
- (C) 4.5 rad/s²
- (D) 3 rad/s²

Q35. A flywheel starts with angular velocity 1 rad/s and angular acceleration 4 rad/s². What is its angular velocity after 3 s?

- (A) 13 rad/s
- (B) 26 rad/s
- (C) 6.5 rad/s
- (D) 19.5 rad/s

Q36. A disc starts with angular velocity 1 rad/s and angular acceleration 2 rad/s². Through what angle does it rotate in 6 s?

- (A) 84 rad
- (B) 42 rad
- (C) 21 rad
- (D) 63 rad

Q37. A 3 kg point mass is attached at a distance of 0.4 m from an axis. What is its moment of inertia about that axis? (Treat it as a point mass.)

- (A) 0.96 kg m²
- (B) 0.24 kg m²
- (C) 0.48 kg m²
- (D) 0.72 kg m²

Q38. What net torque is needed to give a rotor of moment of inertia 6 kg m² an angular acceleration of 2 rad/s²?

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

Unit 6: Energy and Momentum of Rotating Systems

Q39. A spinning disc has moment of inertia 5 kg m² and angular velocity 4 rad/s. What is its rotational kinetic energy?

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

Q40. A wheel has moment of inertia 2 kg m² and spins at 8 rad/s. What is its angular momentum?

- (A) 32 kg m²/s
- (B) 16 kg m²/s
- (C) 8 kg m²/s
- (D) 24 kg m²/s

- Q41. A figure skater spins with moment of inertia 10 kg m^2 at 2 rad/s , then pulls her arms in so her moment of inertia becomes 5 kg m^2 . What is her new angular velocity? (Ignore external torques.)**
- (A) 8 rad/s
 - (B) 2 rad/s
 - (C) 4 rad/s
 - (D) 6 rad/s
- Q42. A rolling object of mass 6 kg moves at 4 m/s . Its moment of inertia is 3 kg m^2 and its radius is 0.5 m . What is its total kinetic energy?**
- (A) 288 J
 - (B) 72 J
 - (C) 216 J
 - (D) 144 J
- Q43. A mass of 4 kg falls 10 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) 14 rad/s
 - (B) 28 rad/s
 - (C) 7 rad/s
 - (D) 21 rad/s
- Q44. A 1 kg particle moves at 10 m/s at a perpendicular distance of 5 m from a point. What is its angular momentum about that point?**
- (A) $100 \text{ kg m}^2/\text{s}$
 - (B) $50 \text{ kg m}^2/\text{s}$
 - (C) $25 \text{ kg m}^2/\text{s}$
 - (D) $75 \text{ kg m}^2/\text{s}$
- Q45. A rotor with moment of inertia 5 kg m^2 speeds up from 1 rad/s to 5 rad/s . How much rotational work is done on it?**
- (A) 120 J
 - (B) 30 J
 - (C) 60 J
 - (D) 90 J

Unit 7: Oscillations

- Q46. A 9 kg mass on a spring of spring constant 400 N/m oscillates on a frictionless surface. What is the period of oscillation?**
- (A) 1.88 s
 - (B) 0.47 s
 - (C) 1.41 s
 - (D) 0.94 s
- Q47. A pendulum completes one oscillation in 0.5 s . What is its frequency?**
- (A) 2 Hz
 - (B) 4 Hz
 - (C) 1 Hz
 - (D) 3 Hz

Q48. A simple pendulum has length 0.245 m. What is its period for small oscillations? (Ignore air resistance.)

- (A) 1.99 s
- (B) 0.99 s
- (C) 0.5 s
- (D) 1.49 s

Q49. A mass of 2 kg on a spring ($k = 200 \text{ N/m}$) oscillates with amplitude 0.3 m. What is its maximum speed?

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

Q50. A spring of spring constant 400 N/m oscillates with amplitude 0.15 m. What is the total mechanical energy of the oscillation?

- (A) 9 J
- (B) 2.25 J
- (C) 6.75 J
- (D) 4.5 J

Q51. A pendulum of length 4 m has a period of 4 s. If its length is increased to 16 m, what is its new period?

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

Q52. A 4 kg mass on a spring ($k = 200 \text{ N/m}$) oscillates with amplitude 0.3 m. What is its maximum acceleration?

- (A) 30 m/s^2
- (B) 15 m/s^2
- (C) 7.5 m/s^2
- (D) 22.5 m/s^2

Q53. A 2 kg block on a spring of spring constant 800 N/m oscillates on a frictionless surface. What is the frequency of oscillation?

- (A) 6.37 Hz
- (B) 1.59 Hz
- (C) 3.18 Hz
- (D) 4.77 Hz

Unit 8: Fluids

Q54. A block of mass 300 kg has a volume of 0.1 m^3 . What is its density?

- (A) 6000 kg/m^3
- (B) 1500 kg/m^3
- (C) 4500 kg/m^3
- (D) 3000 kg/m^3

Q55. A force of 100 N acts on an area of 0.2 m^2 . What pressure does it exert?

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

Q56. What is the gauge pressure due to water at a depth of 2 m below the surface? (Density of water = 1000 kg/m^3 .)

- (A) 39200 Pa
- (B) 19600 Pa
- (C) 9800 Pa
- (D) 29400 Pa

Q57. A solid of volume 0.01 m^3 is fully submerged in water (density 1000 kg/m^3). What is the buoyant force on it?

- (A) 196 N
- (B) 49 N
- (C) 98 N
- (D) 147 N

Q58. Water flows through a pipe of cross-sectional area 0.05 m^2 at 4 m/s, then enters a narrower section of area 0.025 m^2 . What is the speed in the narrower section?

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

Q59. Water flows through a pipe of cross-sectional area 0.04 m^2 at 5 m/s. What is the volume flow rate?

- (A) $0.2 \text{ m}^3/\text{s}$
- (B) $0.4 \text{ m}^3/\text{s}$
- (C) $0.1 \text{ m}^3/\text{s}$
- (D) $0.3 \text{ m}^3/\text{s}$

Q60. Water speeds up from 1 m/s to 3 m/s in a horizontal pipe. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)

- (A) 8000 Pa
- (B) 4000 Pa
- (C) 2000 Pa
- (D) 6000 Pa

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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