

AP Physics 1 Practice Test 18

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

- (A) 10000 m/s
- (B) 0.06 m/s
- (C) 8 m/s
- (D) 16 m/s

Q2. A delivery scooter starts from a velocity of 6 m/s and accelerates uniformly at 3 m/s^2 for 5 s. What is its final velocity? (Ignore air resistance.)

- (A) 21 m/s
- (B) 9 m/s
- (C) 15 m/s
- (D) 36 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 4 s?

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

Q4. A stone is dropped from rest from a bridge 78.4 m above a river. Ignoring air resistance, how long does it take to reach the water?

- (A) 5 s
- (B) 8 s
- (C) 4 s
- (D) 2 s

Q5. A train increases its speed by 28 m/s in 5 s with constant acceleration. What is the magnitude of its acceleration?

- (A) 140 m/s^2
- (B) 2.8 m/s^2
- (C) 28 m/s^2
- (D) 5.6 m/s^2

Q6. A kart starts from rest and accelerates uniformly at 3 m/s^2 . How far does it travel in 4 s?

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

Q7. A car travelling at 24 m/s brakes with a constant deceleration of 5 m/s^2 on a dry road. What is its stopping distance?

- (A) 115.2 m
- (B) 57.6 m
- (C) 4.8 m
- (D) 28.8 m

Unit 2: Force and Translational Dynamics

Q8. A net force acts on a 8 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) 11 N
- (B) 48 N
- (C) 24 N
- (D) 2.67 N

Q9. What is the weight of a 20 kg suitcase on Earth?

- (A) 20 N
- (B) 200 N
- (C) 98 N
- (D) 196 N

Q10. A crate on a horizontal floor experiences a normal force of 200 N. If the coefficient of kinetic friction is 0.3, what is the magnitude of the kinetic friction force?

- (A) 60 N
- (B) 0.3 N
- (C) 200 N
- (D) 120 N

Q11. A 10 kg wagon is pulled to the right with a 80 N force while a 20 N friction force acts to the left. What is the wagon's acceleration?

- (A) 10 m/s^2 to the right
- (B) 6 m/s^2 to the right
- (C) 8 m/s^2 to the right
- (D) 6 m/s^2 to the left

Q12. A 12 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) 117.6 N
- (B) 88.2 N
- (C) 58.8 N
- (D) 29.4 N

Q13. Two masses of 7 kg and 3 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) 6.86 m/s^2
- (C) 7.84 m/s^2
- (D) 3.92 m/s^2

Q14. A spring with spring constant 300 N/m is stretched 0.14 m from equilibrium. What is the magnitude of the spring force?

- (A) 42 N
- (B) 2142.86 N
- (C) 300.14 N
- (D) 84 N

Q15. A 70 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) 686 N
- (B) 826 N
- (C) 546 N
- (D) 140 N

Unit 3: Work, Energy, and Power

Q16. A gardener pushes a wheelbarrow with a constant horizontal force of 70 N through a distance of 12 m. How much work is done by the push?

- (A) 82 J
- (B) 5.83 J
- (C) 840 J
- (D) 1680 J

Q17. What is the kinetic energy of a 4 kg medicine ball moving at 10 m/s?

- (A) 40 J
- (B) 400 J
- (C) 100 J
- (D) 200 J

Q18. A 7 kg box is raised 10 m above the ground at constant speed. By how much does its gravitational potential energy increase?

- (A) 686 J
- (B) 70 J
- (C) 68.6 J
- (D) 343 J

Q19. A crane does 1600 J of work in 20 s while lifting a load. What is its average power output?

- (A) 32000 W
- (B) 80 W
- (C) 800 W
- (D) 160 W

Q20. A diver drops from rest from a platform 30 m above the water. Ignoring air resistance, what is the diver's speed just before hitting the water?

- (A) 294 m/s
- (B) 17.15 m/s
- (C) 24.25 m/s
- (D) 12.12 m/s

Q21. A spring with spring constant 300 N/m is compressed 0.2 m from equilibrium. How much elastic potential energy is stored in the spring?

- (A) 60 J
- (B) 12 J
- (C) 9 J
- (D) 6 J

Q22. A motor lifts a 30 kg crate 5 m in 10 s at constant speed. What is the average power output of the motor?

- (A) 147 W
- (B) 1470 W
- (C) 14700 W
- (D) 73.5 W

Unit 4: Linear Momentum

Q23. What is the magnitude of the momentum of a 5 kg bowling ball rolling at 12 m/s?

- (A) 17 kg·m/s
- (B) 60 kg·m/s
- (C) 720 kg·m/s
- (D) 30 kg·m/s

Q24. A constant force of 60 N acts on a hockey puck for 3 s. What is the impulse delivered to the puck?

- (A) 20 N·s
- (B) 63 N·s
- (C) 180 N·s
- (D) 360 N·s

Q25. A 6 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) 18 m/s
- (C) 9 m/s
- (D) 4.5 m/s

Q26. An astronaut of mass 70 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) 0.29 m/s
- (B) 10 m/s
- (C) 350 m/s
- (D) 0.57 m/s

Q27. A 2 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) 10 kg·m/s
- (B) 20 kg·m/s
- (C) 0 kg·m/s
- (D) 30 kg·m/s

Q28. A footballer's foot changes a ball's momentum by $180 \text{ kg}\cdot\text{m/s}$ during a contact lasting 4 s. What is the average force exerted on the ball?

- (A) 720 N
- (B) 180 N
- (C) 45 N
- (D) 22.5 N

Q29. Two bumper cars move in the same direction and stick together on collision. The first has mass 4 kg and velocity 5 m/s; the second has mass 1 kg and velocity 3 m/s. What is their velocity after the collision? (Ignore friction.)

- (A) 4 m/s
- (B) 5 m/s
- (C) 9.2 m/s
- (D) 4.6 m/s

Q30. Two skaters glide in the same direction. One has mass 4 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) $20 \text{ kg}\cdot\text{m/s}$
- (B) $12 \text{ kg}\cdot\text{m/s}$
- (C) $8 \text{ kg}\cdot\text{m/s}$
- (D) $25 \text{ kg}\cdot\text{m/s}$

Unit 5: Torque and Rotational Dynamics

Q31. A wrench handle is 0.6 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) $83.33 \text{ N}\cdot\text{m}$
- (B) $30 \text{ N}\cdot\text{m}$
- (C) $50.6 \text{ N}\cdot\text{m}$
- (D) $60 \text{ N}\cdot\text{m}$

Q32. What is the moment of inertia of a 4 kg point mass at a distance of 0.5 m from an axis of rotation?

- (A) $2 \text{ kg}\cdot\text{m}^2$
- (B) $4 \text{ kg}\cdot\text{m}^2$
- (C) $1 \text{ kg}\cdot\text{m}^2$
- (D) $3 \text{ kg}\cdot\text{m}^2$

Q33. A net torque of $24 \text{ N}\cdot\text{m}$ acts on a wheel with moment of inertia $3 \text{ kg}\cdot\text{m}^2$. What is the wheel's angular acceleration?

- (A) 72 rad/s^2
- (B) 0.12 rad/s^2
- (C) 4 rad/s^2
- (D) 8 rad/s^2

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

- (A) 16 rad/s
- (B) 7 rad/s
- (C) 12 rad/s
- (D) 32 rad/s

Q35. A uniform plank is balanced on a pivot. A weight of 140 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) 140 N
- (B) 35 N
- (C) 560 N
- (D) 70 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 5 s?

- (A) 10 rad
- (B) 25 rad
- (C) 35 rad
- (D) 70 rad

Q37. Two torques act on a door about its hinges: 50 N·m clockwise and 10 N·m anticlockwise. What is the net torque?

- (A) 60 N·m clockwise
- (B) 40 N·m anticlockwise
- (C) 10 N·m clockwise
- (D) 40 N·m clockwise

Unit 6: Energy and Momentum of Rotating Systems

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

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

Q39. A spinning disc has moment of inertia 5 kg·m² and angular velocity 2 rad/s. What is its angular momentum?

- (A) 7 kg·m²/s
- (B) 10 kg·m²/s
- (C) 2.5 kg·m²/s
- (D) 20 kg·m²/s

Q40. An ice skater spins with moment of inertia $4 \text{ kg}\cdot\text{m}^2$ at 5 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) 5 rad/s
- (B) 2.5 rad/s
- (C) 10 rad/s
- (D) 20 rad/s

Q41. A hoop of mass 4 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) 18 J
- (B) 12 J
- (C) 72 J
- (D) 36 J

Q42. A constant torque of $20 \text{ N}\cdot\text{m}$ rotates a shaft through an angle of 4 rad . How much work is done by the torque?

- (A) 80 J
- (B) 5 J
- (C) 24 J
- (D) 160 J

Q43. A solid disc of mass 4 kg and radius 0.5 m rotates at 14 rad/s . Its moment of inertia is $0.5mr^2$. What is its rotational kinetic energy?

- (A) 7 J
- (B) 49 J
- (C) 98 J
- (D) 24.5 J

Q44. A 2 kg particle moves at 7 m/s at a perpendicular distance of 0.4 m from a fixed point. What is its angular momentum about that point?

- (A) $14 \text{ kg}\cdot\text{m}^2/\text{s}$
- (B) $0.8 \text{ kg}\cdot\text{m}^2/\text{s}$
- (C) $5.6 \text{ kg}\cdot\text{m}^2/\text{s}$
- (D) $11.2 \text{ kg}\cdot\text{m}^2/\text{s}$

Q45. A turbine wheel with moment of inertia $6 \text{ kg}\cdot\text{m}^2$ speeds up from 2 rad/s to 8 rad/s . By how much does its rotational kinetic energy increase?

- (A) 192 J
- (B) 12 J
- (C) 360 J
- (D) 180 J

Unit 7: Oscillations

Q46. A mass of 16 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) 2.51 s
- (B) 15.7 s
- (C) 1.26 s
- (D) 5.02 s

Q47. A simple pendulum has length 5.51 m. Using $\pi = 3.14$ and $g = 9.8 \text{ m/s}^2$, what is its period for small oscillations?

- (A) 14.74 s
- (B) 4.71 s
- (C) 2.35 s
- (D) 9.42 s

Q48. A vibrating string completes 30 oscillations in 10 s. What is its frequency?

- (A) 0.33 Hz
- (B) 300 Hz
- (C) 3 Hz
- (D) 6 Hz

Q49. A mass on a spring oscillates with amplitude 0.3 m and angular frequency 5 rad/s. What is its maximum speed?

- (A) 16.67 m/s
- (B) 0.45 m/s
- (C) 3 m/s
- (D) 1.5 m/s

Q50. A spring of spring constant 200 N/m oscillates with amplitude 0.2 m. What is the total mechanical energy of the oscillation?

- (A) 4 J
- (B) 40 J
- (C) 8 J
- (D) 6 J

Q51. A mass-spring system has a period of 2 s. If the mass is quadrupled while the spring constant stays the same, what is the new period?

- (A) 2 s
- (B) 4 s
- (C) 8 s
- (D) 1 s

Q52. A particle in simple harmonic motion has angular frequency 4 rad/s and amplitude 0.35 m. What is its maximum acceleration?

- (A) 1.4 m/s^2
- (B) 16 m/s^2
- (C) 5.6 m/s^2
- (D) 11.2 m/s^2

Unit 8: Fluids

Q53. A metal block has mass 60 kg and volume 0.02 m^3 . What is its density?

- (A) 1.2 kg/m^3
- (B) 0 kg/m^3
- (C) 1500 kg/m^3
- (D) 3000 kg/m^3

- Q54. A force of 300 N acts uniformly over an area of 0.5 m^2 . What is the pressure?**
- (A) 600 Pa
 - (B) 150 Pa
 - (C) 300.5 Pa
 - (D) 1200 Pa
- Q55. What is the gauge pressure due to water at a depth of 4 m below the surface? (Density of water = 1000 kg/m^3 , $g = 9.8 \text{ m/s}^2$.)**
- (A) 4000 Pa
 - (B) 39200 Pa
 - (C) 39.2 Pa
 - (D) 19600 Pa
- Q56. A block displaces 0.03 m^3 of water when fully submerged. What is the buoyant force on it? (Density of water = 1000 kg/m^3 .)**
- (A) 30 N
 - (B) 0.29 N
 - (C) 294 N
 - (D) 588 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 0.04 m^2 . What is the water speed in the second section?**
- (A) 1 m/s
 - (B) 3 m/s
 - (C) 5 m/s
 - (D) 2 m/s
- Q58. Water flows through a horizontal pipe that narrows from a cross-sectional area of 0.040 m^2 to 0.010 m^2 . If the speed of the water in the wide section is 1.0 m/s, what is the speed in the narrow section?**
- (A) 4.0 m/s
 - (B) 0.25 m/s
 - (C) 1.0 m/s
 - (D) 16 m/s
- Q59. In a horizontal pipe, water speeds up from 2 m/s to 6 m/s. By how much does the pressure drop? (Density of water = 1000 kg/m^3 .)**
- (A) 4000 Pa
 - (B) 16000 Pa
 - (C) 8000 Pa
 - (D) 32000 Pa
- Q60. A wooden block of density 400 kg/m^3 floats in water of density 1000 kg/m^3 . What percentage of the block's volume is submerged?**
- (A) 50%
 - (B) 20%
 - (C) 40%
 - (D) 80%

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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