AP Physics 1 Practice Ladder

Choose one answer per question. Circle A, B, C, or D.

1. A velocity-time graph shows a straight segment from 2 meters per second at 0 seconds to 6 meters per second at 4 seconds. What is the displacement over the segment?

A. 16 meters
B. 8 meters
C. 12 meters
D. 24 meters

2. A satellite is moved to twice its original distance from the center of the same planet. What is the new gravitational force on it compared with the original force?

A. Twice as large
B. One-half as large
C. One-quarter as large
D. Four times as large

3. Two forces act on a board, perpendicular to their lever arms. A force of 3 newtons acts 0.40 meter from the pivot and tends to turn the board counterclockwise. A force of 5 newtons acts 0.20 meter from the pivot and tends to turn the board clockwise. What is the net torque from these forces?

A. 0.20 newton-meter clockwise
B. 0.20 newton-meter counterclockwise
C. 2.20 newton-meters counterclockwise
D. 1.00 newton-meter clockwise

4. Take east as positive. A 1-kilogram puck moves west at 1 meter per second, then receives an eastward net impulse of 2 newton-seconds. What is its final velocity?

A. 3 meters per second east
B. 1 meter per second west
C. 2 meters per second east
D. 1 meter per second east

5. Two connected, open reservoirs contain still water. Their widths differ, but point A and point B are at equal depths below the shared water surface. How do the gauge pressures at the two points compare?

A. Pressure is greater in the wider reservoir.
B. They are equal.
C. Pressure is greater in the narrower reservoir.
D. Both gauge pressures must be zero at any depth.

6. A force in the direction of motion increases linearly from 0 to 12 newtons as an object moves from 0 to 3 meters. The force stays at 12 newtons from 3 to 5 meters. How much work does this force do?

A. 42 joules
B. 24 joules
C. 36 joules
D. 60 joules

7. A 1.5-kilogram cart rolls east at 4 meters per second and sticks to a stationary 2.5-kilogram cart. Assume negligible external horizontal impulse. What is their shared velocity?

A. 4 meters per second east
B. 1.5 meters per second west
C. 2.5 meters per second east
D. 1.5 meters per second east

8. Two flywheels spin at the same nonzero angular speed. Their rotational inertias are 0.60 and 0.30 kilogram-meter squared, respectively. How does the first wheel’s rotational kinetic energy compare with the second’s?

A. It is half as large.
B. It is four times as large.
C. It is twice as large.
D. It is the same.

9. A mass oscillates on an ideal spring. The mass is replaced with one four times as large while the spring constant stays the same. What happens to the period?

A. It doubles.
B. It quadruples.
C. It halves.
D. It becomes one-quarter as long.

10. An unattached block of uniform density 750 kilograms per cubic meter floats at rest in water of density 1,000 kilograms per cubic meter. What fraction of the block’s volume is submerged?

A. 4/3
B. 1/4
C. 1/2
D. 3/4

11. A ball is launched horizontally at 5 meters per second from a platform 3.2 meters above a level floor. Use 10 meters per second squared for gravity and ignore air resistance. How far from the platform’s base does the ball land?

A. 5 meters
B. 2.5 meters
C. 4 meters
D. 8 meters

12. An 8-newton force acts 0.50 meter from a disk’s axle at an angle of 30 degrees to the radius pointing from the axle to the point of application. The disk’s rotational inertia is 0.40 kilogram-meter squared. With no other torque, what is the magnitude of its angular acceleration?

A. 2 radians per second squared
B. 5 radians per second squared
C. 10 radians per second squared
D. 20 radians per second squared

13. A spinning platform has rotational inertia 2.4 kilogram-meter squared and angular speed 2 radians per second. With negligible external torque, its rotational inertia drops to 0.8 kilogram-meter squared. What happens to its angular speed and rotational kinetic energy?

A. Speed becomes 2/3 radian per second and kinetic energy falls to one third.
B. Speed becomes 6 radians per second and kinetic energy stays the same.
C. Speed becomes 2 radians per second and kinetic energy triples.
D. Speed becomes 6 radians per second and kinetic energy triples.

14. A 0.50-kilogram mass oscillates on a frictionless horizontal spring with spring constant 200 newtons per meter and amplitude 0.10 meter. What is its speed when it is 0.06 meter from equilibrium?

A. 1.6 meters per second
B. 0.8 meter per second
C. 2.0 meters per second
D. 2.56 meters per second

15. Steady, incompressible water flows through a horizontal pipe. The cross section narrows from 4 to 2 square centimeters, and the speed in the wider section is 2 meters per second. Use water density 1,000 kilograms per cubic meter and ignore energy losses. How does pressure change from the wider to the narrower section?

A. It falls by 2,000 pascals.
B. It rises by 6,000 pascals.
C. It falls by 6,000 pascals.
D. It stays the same.