Work, Energy, and Power Concepts

Physics · Practice Test · 20 Questions

1. In physics, what is the precise definition of 'work'?

A) The capacity to do physical labor for extended periods.
B) The product of force and the displacement over which it acts.
C) The rate at which energy is transferred.
D) The ability to perform actions quickly.

2. Energy is defined in physics as:

A) The speed at which work is done.
B) A measure of stamina or the capacity to do work.
C) The force exerted on an object.
D) The total distance an object can travel.

3. The term 'power' in physics is closely related to:

A) The total amount of work done.
B) The force applied during a task.
C) The rate at which work is done or energy is transferred.
D) The efficiency of a machine.

4. What is the scalar product (dot product) of two vectors A and B?

A) A vector perpendicular to both A and B.
B) A scalar quantity equal to AB cos ?.
C) A vector representing the sum of A and B.
D) A scalar quantity equal to AB sin ?.

5. According to the work-energy theorem, the change in kinetic energy of a particle is equal to:

A) The potential energy of the particle.
B) The work done by the net force on the particle.
C) The power delivered to the particle.
D) The total momentum of the particle.

6. When is no work done by a force on an object?

A) When the force is very large.
B) When the object is moving at a high speed.
C) When the displacement is zero or the force is perpendicular to the displacement.
D) When the object is accelerating.

7. Kinetic energy is a measure of:

A) The position of an object.
B) The potential energy stored in an object.
C) The work an object can do by virtue of its motion.
D) The force applied to an object.

8. What is the SI unit of work and energy?

A) Watt (W)
B) Newton (N)
C) Joule (J)
D) Pascal (Pa)

9. For a variable force F(x), how is the work done calculated?

A) As the product of F and the displacement.
B) As the integral of F(x) with respect to x.
C) As the sum of F(x) multiplied by small displacements.
D) As the average force multiplied by the displacement.

10. Potential energy is described as:

A) Energy due to motion.
B) Energy stored by virtue of position or configuration.
C) Energy dissipated as heat.
D) The rate of work done.

11. The principle of conservation of mechanical energy states that:

A) Kinetic energy is always conserved.
B) Potential energy is always conserved.
C) The sum of kinetic and potential energy remains constant if only conservative forces do work.
D) Work done is always equal to potential energy.

12. Gravitational potential energy of an object near the Earth's surface is given by $V(h) = mgh$. This implies that:

A) The gravitational force is directly proportional to height.
B) The gravitational force is the negative derivative of potential energy with respect to height.
C) Potential energy increases linearly with height.
D) The gravitational force is zero at ground level.

13. What is the potential energy of an ideal spring with spring constant k and displacement x from equilibrium?

A) kx
B) kx^2
C) kx^2 / 2
D) k/x

14. In a collision, what quantity is always conserved?

A) Kinetic energy
B) Total energy
C) Linear momentum
D) Potential energy

15. An elastic collision is characterized by:

A) Loss of kinetic energy.
B) Conservation of kinetic energy.
C) Generation of heat and sound.
D) The two bodies sticking together.

16. A completely inelastic collision is one where:

A) Kinetic energy is conserved.
B) Momentum is not conserved.
C) The two bodies move together with the same final velocity.
D) The bodies rebound with their initial kinetic energy.

17. What is the SI unit of power?

A) Joule (J)
B) Newton (N)
C) Watt (W)
D) Ampere (A)

18. If the work done by a force is W and the time taken is t, the average power is given by:

A) W * t
B) W / t
C) t / W
D) W + t

19. Which of the following is a non-conservative force?

A) Gravitational force
B) Spring force
C) Frictional force
D) Elastic force

20. The scalar product A.B can be interpreted as:

A) The product of the magnitudes of A and B.
B) The product of the magnitude of A and the component of B along A.
C) The product of the magnitudes of A and B multiplied by sin ?.
D) A vector perpendicular to both A and B.