

Work, Energy, and Power Concepts

Physics · Answer Key · 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 $AB \cos \theta$.**
- C) A vector representing the sum of A and B.
- D) A scalar quantity equal to $AB \sin \theta$.

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 $\mathbf{A} \cdot \mathbf{B}$ 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 $\sin \theta$.
- D) A vector perpendicular to both A and B.