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AMC/AFNS/NUMS Physics-2 Test Preparation

Force, Work, Energy and Power

1. Force is defined as:

- A. Rate of change of displacement
- B. Push or pull that changes or tends to change motion
- C. Rate of doing work
- D. Product of mass and velocity

Correct Answer: B. Push or pull that changes or tends to change motion

Explanation: Force is a push or pull acting on an object that can change its state of rest or motion. It may start motion, stop motion, change speed, change direction, or change shape. Force is a vector quantity because it has both magnitude and direction.

2. The SI unit of force is:

- A. Joule
- B. Watt
- C. Newton
- D. Pascal

Correct Answer: C. Newton

Explanation: The SI unit of force is newton, represented by N. One newton is the force required to produce an acceleration of 1 m/s^2 in a body of mass 1 kg. It is derived from Newton's second law, $F = ma$.

3. Newton's Second Law of Motion is expressed as:

- A. $F = ma$
- B. $W = Fs$
- C. $P = W/t$
- D. $E = mc^2$

Correct Answer: A. $F = ma$

Explanation: Newton's second law states that force is equal to mass multiplied by acceleration. It shows that acceleration increases when force increases and decreases when mass increases, if the applied force remains the same.

4. The force required to accelerate a 2 kg body at 3 m/s^2 is:

- A. 2 N
- B. 3 N
- C. 5 N
- D. 6 N

Correct Answer: D. 6 N

Explanation: Using $F = ma$, force = $2 \times 3 = 6 \text{ N}$. Therefore, a force of 6 newtons is needed to produce an acceleration of 3 m/s^2 in a body of mass 2 kg.

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5. Weight is the force due to:

- A. Friction
- B. Gravity
- C. Magnetism
- D. Tension

Correct Answer: B. Gravity

Explanation: Weight is the gravitational force acting on a body. It depends on mass and gravitational acceleration. Mass remains constant everywhere, but weight changes from place to place because gravity may be different.

6. The formula for weight is:

- A. $W = mg$
- B. $W = Fs$
- C. $W = Pt$
- D. $W = mv$

Correct Answer: A. $W = mg$

Explanation: Weight is calculated by $W = mg$, where m is mass and g is acceleration due to gravity. On Earth, the average value of g is about 9.8 m/s^2 . This formula shows that greater mass means greater weight.

7. Work is said to be done when:

- A. Force acts but no displacement occurs
- B. Displacement occurs without force
- C. Force causes displacement
- D. Body remains at rest

Correct Answer: C. Force causes displacement

Explanation: In physics, work is done only when a force acts on a body and produces displacement in the direction of the force. If force is applied but the object does not move, no work is done scientifically.

8. The formula for work is:

- A. $W = Fs$
- B. $W = ma$
- C. $W = mv$
- D. $W = P/t$

Correct Answer: A. $W = Fs$

Explanation: Work is equal to force multiplied by displacement in the direction of force. The formula is $W = Fs$. If the force acts at an angle, the formula becomes $W = Fs \cos \theta$.

9. The SI unit of work is:

- A. Newton
- B. Joule
- C. Watt

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D. Kilogram

Correct Answer: B. Joule

Explanation: The SI unit of work is joule, represented by J. One joule is the work done when a force of 1 newton moves a body through 1 meter in the direction of force.

10. If a force of 10 N moves a body 5 m, work done is:

A. 2 J

B. 5 J

C. 15 J

D. 50 J

Correct Answer: D. 50 J

Explanation: Work is calculated by $W = Fs$. Here, force = 10 N and displacement = 5 m, so $W = 10 \times 5 = 50$ J. Therefore, the work done is 50 joules.

11. No work is done when the angle between force and displacement is:

A. 0°

B. 45°

C. 90°

D. 180°

Correct Answer: C. 90°

Explanation: Work done is given by $W = Fs \cos \theta$. When the angle between force and displacement is 90° , $\cos 90^\circ = 0$. Therefore, work done becomes zero.

12. Energy is defined as:

A. Rate of doing work

B. Capacity to do work

C. Force per unit area

D. Change in velocity

Correct Answer: B. Capacity to do work

Explanation: Energy is the capacity or ability of a body to do work. Whenever work is done, energy is transferred or converted from one form into another. Energy may exist as kinetic, potential, heat, chemical, electrical, or nuclear energy.

13. The SI unit of energy is:

A. Newton

B. Watt

C. Joule

D. Meter

Correct Answer: C. Joule

Explanation: Energy is measured in joules because energy represents the ability to do work. Since work and energy are closely related, both have the same SI unit, joule.

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14. Kinetic energy is the energy possessed by a body due to its:

- A. Position
- B. Shape
- C. Motion
- D. Temperature only

Correct Answer: C. Motion

Explanation: Kinetic energy is the energy possessed by a body because of its motion. Moving cars, flowing water, flying birds, and moving bullets all possess kinetic energy.

15. The formula for kinetic energy is:

- A. $KE = mgh$
- B. $KE = \frac{1}{2}mv^2$
- C. $KE = Fs$
- D. $KE = ma$

Correct Answer: B. $KE = \frac{1}{2}mv^2$

Explanation: Kinetic energy is calculated by $KE = \frac{1}{2}mv^2$, where m is mass and v is velocity. Since velocity is squared, increasing speed greatly increases kinetic energy.

16. Potential energy is the energy possessed by a body due to its:

- A. Motion
- B. Position or configuration
- C. Speed only
- D. Acceleration only

Correct Answer: B. Position or configuration

Explanation: Potential energy is stored energy due to the position or arrangement of a body. A raised stone, stretched spring, and compressed rubber band all possess potential energy.

17. Gravitational potential energy is given by:

- A. $PE = mgh$
- B. $PE = \frac{1}{2}mv^2$
- C. $PE = Fs/t$
- D. $PE = mv$

Correct Answer: A. $PE = mgh$

Explanation: Gravitational potential energy depends on mass, gravitational acceleration, and height. The formula $PE = mgh$ shows that an object placed at a greater height has more potential energy.

18. A body of mass 2 kg is raised to a height of 5 m. If $g = 10 \text{ m/s}^2$, its potential energy is:

- A. 10 J
- B. 20 J
- C. 50 J
- D. 100 J

Correct Answer: D. 100 J

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Explanation: Using $PE = mgh$, potential energy $= 2 \times 10 \times 5 = 100$ J. Therefore, the gravitational potential energy gained by the body is 100 joules.

19. The law of conservation of energy states that energy:

- A. Can be created only
- B. Can be destroyed only
- C. Can neither be created nor destroyed
- D. Always disappears during work

Correct Answer: C. Can neither be created nor destroyed

Explanation: The law of conservation of energy states that energy cannot be created or destroyed. It can only change from one form to another. The total energy of an isolated system remains constant.

20. In a falling body, potential energy changes into:

- A. Chemical energy
- B. Kinetic energy
- C. Nuclear energy
- D. Sound energy only

Correct Answer: B. Kinetic energy

Explanation: When a body falls, its height decreases, so its potential energy decreases. At the same time, its velocity increases, so kinetic energy increases. Thus, potential energy changes into kinetic energy.

21. Power is defined as:

- A. Work done per unit time
- B. Force per unit area
- C. Energy per unit mass
- D. Momentum per unit time

Correct Answer: A. Work done per unit time

Explanation: Power is the rate of doing work. It tells how quickly work is done. If two machines do the same work but one takes less time, the faster machine has greater power.

22. The formula for power is:

- A. $P = W/t$
- B. $P = Ft$
- C. $P = ma$
- D. $P = mgh$

Correct Answer: A. $P = W/t$

Explanation: Power is calculated by dividing work done by time taken. The formula is $P = W/t$, where P is power, W is work done, and t is time taken.

23. The SI unit of power is:

- A. Joule

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- B. Newton
- C. Watt
- D. Meter per second

Correct Answer: C. Watt

Explanation: The SI unit of power is watt, represented by W. One watt means one joule of work is done in one second. Large powers are often measured in kilowatts.

24. One watt is equal to:

- A. 1 N/m
- B. 1 J/s
- C. 1 kg/m
- D. 1 m/s²

Correct Answer: B. 1 J/s

Explanation: One watt is equal to one joule per second. It means that if 1 joule of work is done in 1 second, the power developed is 1 watt.

25. If 100 J work is done in 5 seconds, power is:

- A. 5 W
- B. 10 W
- C. 20 W
- D. 50 W

Correct Answer: C. 20 W

Explanation: Power is calculated by $P = W/t$. Here, work = 100 J and time = 5 s, so $P = 100/5 = 20$ W. Therefore, the power is 20 watts.

26. A machine that does work faster has greater:

- A. Mass
- B. Power
- C. Weight
- D. Friction

Correct Answer: B. Power

Explanation: Power depends on how quickly work is done. A machine that completes the same amount of work in less time has greater power than a machine that takes more time.

27. The commercial unit of electrical energy is:

- A. Watt
- B. Kilowatt-hour
- C. Newton
- D. Pascal

Correct Answer: B. Kilowatt-hour

Explanation: The commercial unit of electrical energy is kilowatt-hour, written as kWh. It is commonly used in electricity bills. One kilowatt-hour is the energy consumed by a 1 kW appliance in 1 hour.



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28. One kilowatt is equal to:

- A. 10 W
- B. 100 W
- C. 1000 W
- D. 10,000 W

Correct Answer: C. 1000 W

Explanation: Kilo means one thousand. Therefore, 1 kilowatt is equal to 1000 watts. Kilowatt is used for larger values of power, especially in electrical appliances and machines.

29. Friction is a force that:

- A. Always supports motion
- B. Opposes relative motion
- C. Has no effect on motion
- D. Acts only in vacuum

Correct Answer: B. Opposes relative motion

Explanation: Friction is a contact force that opposes the relative motion or tendency of motion between two surfaces in contact. It may reduce speed, produce heat, and cause wear and tear.

30. Work done against friction is usually converted into:

- A. Heat energy
- B. Nuclear energy
- C. Magnetic energy
- D. Light only

Correct Answer: A. Heat energy

Explanation: When work is done against friction, mechanical energy is usually converted into heat energy. This is why rubbing hands together makes them warm and moving machine parts may become hot.

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