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Physics Grade 9 — Chapter 6

Work and Energy

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Independent practice MCQs from the supplied Class 9 Physics notes pack. Total: 50 questions. Each item has four options, the correct letter, and a short explanation.

A. Important / Main Topics

1. Work is defined as:

(A) Force × distance
(B) Force × time
(C) Force / distance
(D) Force / time

Correct Answer: A

Explanation: The text defines work as force multiplied by distance moved in the direction of the force.

2. The SI unit of work is the:

(A) Newton
(B) Joule
(C) Watt
(D) Pascal

Correct Answer: B

Explanation: The SI unit of work is the joule (J).

3. Work is a:

(A) Vector quantity
(B) Base quantity
(C) Scalar quantity
(D) Derived quantity

Correct Answer: C

Explanation: The text states that work is a scalar quantity.

4. The energy possessed by a body due to its motion is called:

(A) Potential energy
(B) Thermal energy
(C) Chemical energy
(D) Kinetic energy

Correct Answer: D

Explanation: The text defines kinetic energy as the energy of a moving object.

5. The formula for kinetic energy is:

(A) $\frac{1}{2}mv^2$
(B) mgh
(C) mgh^2
(D) $\frac{1}{2}kx^2$

Correct Answer: A

Explanation: The formula for kinetic energy is $\frac{1}{2}mv^2$.

6. The energy possessed by a body due to its position is called:

(A) Kinetic energy
(B) Potential energy
(C) Thermal energy
(D) Electrical energy

Correct Answer: B

Explanation: The text defines potential energy as the energy possessed by a body by virtue of its position.

7. The formula for gravitational potential energy is:

(A) $\frac{1}{2}mv^2$
(B) mgh^2
(C) mgh
(D) $\frac{1}{2}kx^2$

Correct Answer: C

Explanation: The text gives the formula $PE = mgh$ for gravitational potential energy.

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

(A) Can be created
(B) Can be destroyed
(C) Can be created and destroyed
(D) Cannot be created or destroyed

Correct Answer: D

Explanation: The text states that energy can neither be created nor destroyed; it can only be converted from one form to another.

9. Power is defined as:

(A) Work / time
(B) Work × time
(C) Time / work
(D) Work + time

Correct Answer: A

Explanation: The text defines power as the time rate at which work is done, $P = W/t$.

10. The SI unit of power is the:

(A) Joule
(B) Watt
(C) Newton
(D) Pascal

Correct Answer: B

Explanation: The SI unit of power is the watt (W).

11. Efficiency is defined as:

(A) Input / Output
(B) Input × Output
(C) Output / Input
(D) Input + Output

Correct Answer: C

Explanation: The text defines efficiency as the ratio of useful output work to input work, $\eta = W_{\text{out}}/W_{\text{in}}$.

12. Which of the following is a non-renewable energy resource?

(A) Solar energy
(B) Wind energy
(C) Hydroelectric energy
(D) Coal

Correct Answer: D

Explanation: Coal is a fossil fuel and is non-renewable. The others are renewable.

13. Which of the following is a renewable energy resource?

(A) Wind
(B) Natural gas

(C) Petroleum
(D) Uranium

Correct Answer: A

Explanation: Wind is a renewable resource, while natural gas, petroleum, and uranium are non-renewable.

14. No machine is 100% efficient because:

(A) Energy is destroyed
(B) Friction causes energy loss
(C) Energy is created
(D) Machines are not designed well

Correct Answer: B

Explanation: The text states that friction lowers the efficiency of a machine.

15. The energy stored in food is an example of:

(A) Kinetic energy
(B) Elastic potential energy
(C) Chemical potential energy
(D) Gravitational potential energy

Correct Answer: C

Explanation: The energy stored in food is an example of Chemical potential energy.

16. A force of 100 N pushes a box 200 m. The work done is:

(A) 2 J
(B) 200 J
(C) 200,000 J
(D) 20,000 J

Correct Answer: D

Explanation: $W = 100 \times 200 = 20,000\text{ J} = 20\text{ kJ}$, as calculated in the text.

17. If a force of 10 N moves an object 5 m in the direction of the force, the work done is:

(A) 50 J
(B) 2 J
(C) 15 J
(D) 0.5 J

Correct Answer: A

Explanation: If a force of 10 N moves an object 5 m in the direction of the force, the work done is 50 J.

18. Work done is zero when:

(A) Force and displacement are in the same direction
(B) Force and displacement are perpendicular
(C) Force and displacement are in opposite directions
(D) Force is zero

Correct Answer: B

Explanation: When force is perpendicular to displacement, the work done is zero (e.g., carrying a book horizontally).

19. A ball of mass 0.12 kg has a kinetic energy of 50 J. Its speed is approximately:

(A) 10 m/s
(B) 50 m/s
(C) 28.9 m/s
(D) 100 m/s

Correct Answer: C

Explanation: $v = \sqrt{\frac{2KE}{m}} = \sqrt{\frac{2 \times 50}{0.12}} = 28.9\text{ m/s}$, as calculated in the text.

20. A person of mass 60 kg jumps 1.5 m high. His potential energy at the highest point is: (Take $g = 9.8\text{ m/s}^2$)

(A) 600 J

(B) 90 J
(C) 150 J
(D) 882 J

Correct Answer: D

Explanation: $PE = 60 \times 9.8 \times 1.5 = 882\text{ J}$, as calculated in the text.

21. When a book falls from a shelf, its potential energy is converted into:

(A) Kinetic energy
(B) Chemical energy
(C) Electrical energy
(D) Nuclear energy

Correct Answer: A

Explanation: As the book falls, its gravitational potential energy is converted into kinetic energy.

22. A machine does 1000 J of work in 5 seconds. Its power is:

(A) 50 W
(B) 200 W
(C) 500 W
(D) 5000 W

Correct Answer: B

Explanation: A machine does 1000 J of work in 5 seconds. Its power is 200 W.

23. A 100 W light bulb is left on for 10 hours. The energy consumed is:

(A) 10 kWh
(B) 100 kWh
(C) 1 kWh
(D) 1000 kWh

Correct Answer: C

Explanation: A 100 W light bulb is left on for 10 hours. The energy consumed is 1 kWh.

24. One horsepower is equal to:

(A) 100 W
(B) 550 W
(C) 1000 W
(D) 746 W

Correct Answer: D

Explanation: The text states that $1\text{ hp} = 746\text{ W}$.

25. A petrol engine takes in 400 J of fuel energy and does 120 J of useful work. Its efficiency is:

(A) 30%
(B) 10%
(C) 20%
(D) 40%

Correct Answer: A

Explanation: $\eta = 120/400 = 0.3 = 30\%$, as calculated in the text.

B. Less Important / Secondary Topics

26. The efficiency of a typical incandescent light bulb is about:

(A) 5%
(B) 25%
(C) 50%
(D) 95%

Correct Answer: A

Explanation: The text states that the efficiency of an incandescent light bulb is about 5%.

27. The efficiency of a typical automobile engine is about:

(A) 5%
(B) 25%
(C) 50%
(D) 95%

Correct Answer: B

Explanation: The text states that the efficiency of an automobile engine is about 25%.

28. Which of the following has the highest efficiency?

(A) Incandescent light bulb
(B) Automobile engine
(C) Electric generator
(D) Fossil fuel power plant

Correct Answer: C

Explanation: The text states that the efficiency of an electric generator is 98%, which is higher than the others.

29. Which of the following is a non-renewable energy resource?

(A) Solar
(B) Wind
(C) Hydroelectric
(D) Nuclear

Correct Answer: D

Explanation: Nuclear fuel (uranium) is a non-renewable resource. Solar, wind, and hydroelectric are renewable.

30. Which of the following is a renewable energy resource?

(A) Biomass
(B) Coal
(C) Natural gas
(D) Petroleum

Correct Answer: A

Explanation: Biomass is a renewable resource. Coal, natural gas, and petroleum are non-renewable fossil fuels.

31. The energy conversion in a hydroelectric power plant is from:

(A) Chemical energy to electrical energy
(B) Gravitational potential energy to electrical energy
(C) Nuclear energy to electrical energy
(D) Thermal energy to electrical energy

Correct Answer: B

Explanation: The text states that potential energy of water stored at a height is converted into kinetic energy, which is then used to produce electricity.

32. Solar cells convert:

(A) Sunlight into heat
(B) Heat into electricity
(C) Sunlight into electricity
(D) Electricity into light

Correct Answer: C

Explanation: The text states that solar cells directly convert sunlight into electricity.

33. The main material used in solar cells is:

(A) Copper
(B) Iron
(C) Gold
(D) Silicon

Correct Answer: D

Explanation: The text states that solar cells are made of semiconductor materials like silicon.

34. Geothermal energy comes from:

(A) The Earth's core
(B) The Sun
(C) The Moon
(D) Fossil fuels

Correct Answer: A

Explanation: The text states that geothermal energy comes from the Earth's core.

35. Wind energy is the kinetic energy of:

(A) The Sun
(B) Moving air
(C) Water
(D) The Earth's core

Correct Answer: B

Explanation: The text states that the kinetic energy of the wind can be used to turn turbines.

36. A force of 50 N is applied at an angle of 60° to the horizontal to move a box 10 m. The work done is: (Take \(\cos 60° = 0.5\))

(A) 500 J
(B) 1000 J
(C) 250 J
(D) 125 J

Correct Answer: C

Explanation: "250 J" is correct: it matches the idea asked in the question ("A force of 50 N is applied at an angle of 60° to the horizontal to move a box 10 m. The work done is: (Take \(\cos 60° = 0.5\))"), while the other choices do not.

37. A car of mass 1000 kg is moving at 20 m/s. Its kinetic energy is:

(A) \(2 \times 10^4\text{ J}\)
(B) \(2 \times 10^6\text{ J}\)
(C) \(2 \times 10^3\text{ J}\)
(D) \(2 \times 10^5\text{ J}\)

Correct Answer: D

Explanation: A car of mass 1000 kg is moving at 20 m/s. Its kinetic energy is \(2 \times 10^5\text{ J}\).

38. A body of mass 5 kg is lifted to a height of 10 m. The gain in potential energy is: (Take \(g = 10\text{ m/s}^2\))

(A) 500 J
(B) 50 J
(C) 5000 J
(D) 5 J

Correct Answer: A

Explanation: "500 J" is correct: it matches the idea asked in the question ("A body of mass 5 kg is lifted to a height of 10 m. The gain in potential energy is: (Take \(g = 10\text{ m/s}^2\))"), while the other choices do not.

39. A motor lifts a 200 kg load to a height of 10 m in 20 s. The power of the motor is: (Take \(g = 10\text{ m/s}^2\))

(A) 100 W
(B) 1000 W
(C) 10,000 W
(D) 2000 W

Correct Answer: B

Explanation: "1000 W" is correct: it matches the idea asked in the question ("A motor lifts a 200 kg load to a height of 10 m in 20 s. The power of the motor is: (Take \(g = 10\text{ m/s}^2\))"), while the other choices do not.

40. A machine with an input power of 500 W has an efficiency of 80%. The output power is:

(A) 500 W
(B) 100 W
(C) 400 W
(D) 600 W

Correct Answer: C

Explanation: A machine with an input power of 500 W has an efficiency of 80%. The output power is 400 W.

41. A ball is dropped from a height of 20 m. Its speed just before hitting the ground is: (Take $g = 10\text{ m/s}^2$)

(A) 10 m/s
(B) 40 m/s
(C) 200 m/s
(D) 20 m/s

Correct Answer: D

Explanation: "20 m/s" is correct: it matches the idea asked in the question ("A ball is dropped from a height of 20 m. Its speed just before hitting the ground is: (Take $g = 10\text{ m/s}^2$)"), while the other choices do not.

42. A 2 kg object is moving at 6 m/s. Its momentum is:

(A) 12 kg·m/s
(B) 3 kg·m/s
(C) 6 kg·m/s
(D) 24 kg·m/s

Correct Answer: A

Explanation: A 2 kg object is moving at 6 m/s. Its momentum is 12 kg·m/s.

43. A 2 kg object is moving at 6 m/s. Its kinetic energy is:

(A) 12 J
(B) 36 J
(C) 6 J
(D) 72 J

Correct Answer: B

Explanation: A 2 kg object is moving at 6 m/s. Its kinetic energy is 36 J.

44. A body is thrown vertically upward with a velocity of 20 m/s. The maximum height reached is: (Take $g = 10\text{ m/s}^2$)

(A) 10 m
(B) 40 m
(C) 20 m
(D) 5 m

Correct Answer: C

Explanation: "20 m" is correct: it matches the idea asked in the question ("A body is thrown vertically upward with a velocity of 20 m/s. The maximum height reached is: (Take $g = 10\text{ m/s}^2$)"), while the other choices do not.

45. A machine has an input energy of 1000 J and an output energy of 250 J. Its efficiency is:

(A) 50%
(B) 75%
(C) 4%
(D) 25%

Correct Answer: D

Explanation: A machine has an input energy of 1000 J and an output energy of 250 J. Its efficiency is 25%.

46. A car engine converts 5000 J of chemical energy into 1500 J of kinetic energy. The energy lost as heat is:

(A) 3500 J

(B) 1500 J
(C) 5000 J
(D) 6500 J

Correct Answer: A

Explanation: A car engine converts 5000 J of chemical energy into 1500 J of kinetic energy. The energy lost as heat is 3500 J.

47. A 100 g ball is thrown with a velocity of 10 m/s. Its kinetic energy is:

(A) 10 J
(B) 5 J
(C) 50 J
(D) 100 J

Correct Answer: B

Explanation: A 100 g ball is thrown with a velocity of 10 m/s. Its kinetic energy is 5 J.

48. A 5 kg object is lifted from the ground to a height of 4 m. The work done against gravity is: (Take \(g = 10\text{ m/s}^2\))

(A) 20 J
(B) 2000 J
(C) 200 J
(D) 50 J

Correct Answer: C

Explanation: “200 J” is correct: it matches the idea asked in the question (“A 5 kg object is lifted from the ground to a height of 4 m. The work done against gravity is: (Take \(g = 10\text{ m/s}^2\))”), while the other choices do not.

49. A body of mass 2 kg is moving with a velocity of 4 m/s. Its kinetic energy is:

(A) 8 J
(B) 4 J
(C) 32 J
(D) 16 J

Correct Answer: D

Explanation: A body of mass 2 kg is moving with a velocity of 4 m/s. Its kinetic energy is 16 J.

50. A 60 W bulb is used for 5 hours. The energy consumed in kWh is:

(A) 0.3 kWh
(B) 3 kWh
(C) 30 kWh
(D) 0.03 kWh

Correct Answer: A

Explanation: A 60 W bulb is used for 5 hours. The energy consumed in kWh is 0.3 kWh.