1. A constant force of 10 N moves a body in the direction of the force by 2 m. What is the work done?
A) 5 J B) 10 J C) 20 J D) 0 J
Answer: C) 20 J Explanation: Work done, $W = F \times d \times \cos\theta$ Here, $\theta = 0^{\circ}$, so $\cos\theta = 1$ $\Rightarrow W = 10 \times 2 \times 1 = 20 \text{ J}$
2. A porter lifts a 15 kg luggage on his head to a height of 2 m. (Take $g = 10 \text{ m/s}^2$). What is the work done?
A) 300 J B) 150 J C) 30 J D) 75 J
Inswer: A) 300 J Explanation: Work done = $m \times g \times h$ = $15 \times 10 \times 2 = 300 \text{ J}$
3. When is the work done by a force equal to zero?
A) When displacement is zero B) When force is zero C) When force is perpendicular to displacement D) All of the above
Inswer: D) All of the above Explanation:
If displacement = 0, then W = 0

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If force = 0, then W = 0

If $\theta = 90^{\circ}$, then $\cos\theta = 0 \Rightarrow W = 0$ So, all the given conditions lead to zero work.

- 4. A man pushes a wall but the wall does not move. What is the work done by the man?
- A) Positive
- B) Negative
- C) Zero
- D) Infinite
- ✓ Answer: C) Zero

 ② Explanation:

Since displacement = 0,

Work done = Force × Displacement = 0

- ⇒ No work is done
- 5. What is the SI unit of power?
- A) Joule
- B) Watt
- C) Newton
- D) Kilowatt-hour
- ✓ nswer: B) Watt

② Explanation:

Power = Work / Time

Unit = Joule / second = Watt (W)

- 6. One kilowatt-hour is equal to:
- A) 1000 J
- B) 3600 J
- C) 360000 J
- D) $3.6 \times 10^6 \, J$
- ✓ nswer: D) 3.6 × 10⁶ J

② Explanation:

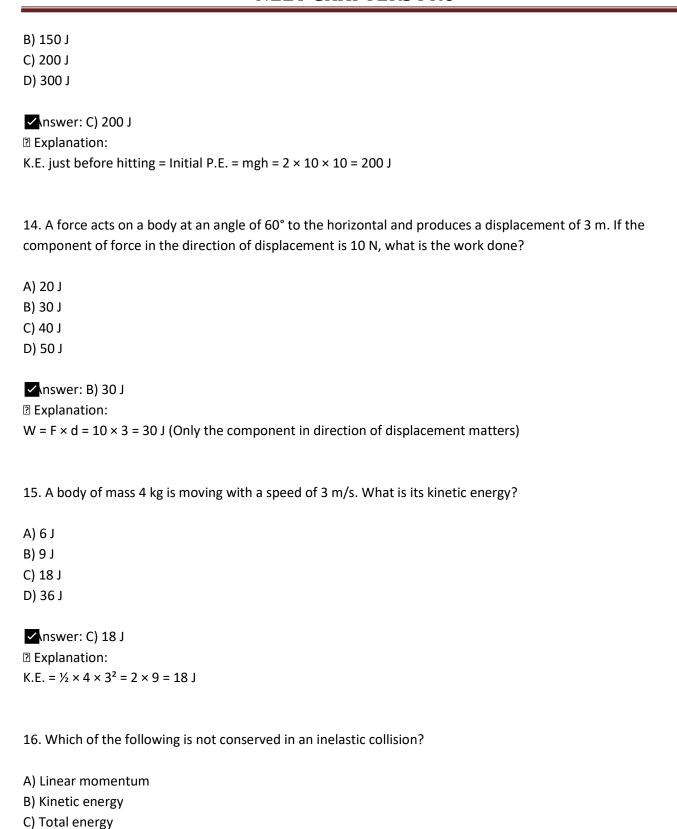
 $1 \text{ kWh} = 1000 \text{ W} \times 3600 \text{ s} = 3.6 \times 10^6 \text{ J}$

A) Force
B) Acceleration
C) Work
D) Velocity
✓nswer: C) Work
② Explanation:
Work has only magnitude and no direction, so it's a scalar quantity.
8. What is the work done by centripetal force during uniform circular motion?
A) Positive
B) Negative
C) Zero
D) Depends on speed
✓ nswer: C) Zero
② Explanation:
Centripetal force is perpendicular to the direction of motion.
So, $W = F \times d \times cos90^{\circ} = 0$
⇒ No work is done
9. A car of mass 1000 kg moves with speed 36 km/h. What is its kinetic energy?
A) 5×10^4 J
B) 1.8×10^5 J
C) 3.6 × 10 ⁵ J
D) 7.2 × 10⁵ J
\sim nswer: A) 5 × 10 ⁴ J
② Explanation:
Speed = $36 \text{ km/h} = 10 \text{ m/s}$

 $\label{eq:continuous} \textbf{7. Which of the following is a scalar quantity?}$

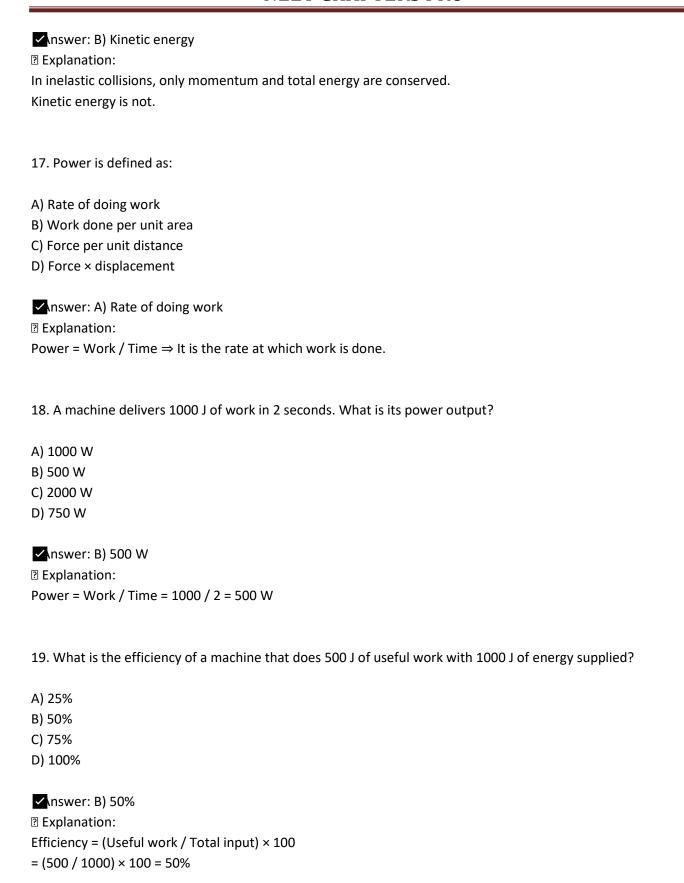
K.E. = $\frac{1}{2}$ × m × v^2 = $\frac{1}{2}$ × 1000 × 10² = 5 × 10⁴ J

10. Potential energy of a body depends on:
A) Speed
B) Volume
C) Surface Area
D) Position
✓nswer: D) Position
② Explanation:
P.E. = mgh ⇒ depends on height or position above the ground.
11. Which graph correctly represents the work done by a constant force as a function of displacement?
A) A curve increasing with displacement
B) A straight line passing through the origin
C) A parabola
D) A horizontal straight line
nswer: B) A straight line passing through the origin
② Explanation:
For constant force: W = F × d
As d increases, W increases linearly ⇒ Straight line through origin.
7.5 a mercases, w mercases meany -> straight me through origin.
12. A spring is compressed by 5 cm. If the spring constant is 200 N/m, what is the potential energy stored in it?
A) 0.125 J
B) 0.25 J
C) 1 J
D) 2.5 J
Angwar: A) 0.125 I
✓nswer: A) 0.125 J
② Explanation: $U = 1/4 \times 300 \times (0.05)^2 = 0.135 \text{ L}$
$U = \frac{1}{2} k x^{2} = \frac{1}{2} \times 200 \times (0.05)^{2} = 0.125 J$
13. A 2 kg body is dropped from a height of 10 m. What is its kinetic energy just before hitting the ground? ($g = \frac{100 \text{ m/s}^2}{3}$)
10 m/s ²)
A) 100 J



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D) Mass



20. An object is lifted vertically upward. Which of the following statements is true?
A) Work done by gravity is positive B) Work done by applied force is negative C) Work done by gravity is negative D) Net work done is zero
✓ nswer: C) Work done by gravity is negative ② Explanation: Gravity acts downward, displacement is upward \Rightarrow Angle = 180°, $\cos\theta = -1 \Rightarrow$ W = -mgh \Rightarrow Negative work by gravity
21. A body of mass 2 kg is moving on a frictionless horizontal surface with a velocity of 5 m/s. A constant force of 2 N acts on it in the direction of motion for 5 seconds. What is the work done by the force?
A) 25 J B) 50 J C) 75 J D) 100 J
✓ Answer: C) 75 J ② Explanation: First, find acceleration:
Initial velocity , time Displacement:
Work = $F \times s = 2 \times 37.5 = 75 J$
22. A block of mass 10 kg is lifted to a height of 2 m in 5 seconds. What is the average power required? (Take $g = 10 \text{ m/s}^2$)
A) 20 W

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B) 40 W C) 100 W

D) 200 W

nswer: B) 40 W

② Explanation:

Work = mgh = $10 \times 10 \times 2 = 200 \text{ J}$

Power = Work / Time = 200 / 5 = 40 W

- 23. If the velocity of a particle is doubled, what happens to its kinetic energy?
- A) Remains the same
- B) Doubles
- C) Triples
- D) Becomes four times
- nswer: D) Becomes four times

Explanation:

K.E. $\propto v^2$

So if velocity doubles ($v \rightarrow 2v$):

K.E. $\propto (2v)^2 = 4v^2 \Rightarrow$ K.E. becomes 4 times

- 24. Two objects of equal mass move with speeds v and 2v respectively. What is the ratio of their kinetic energies?
- A) 1:2
- B) 1:4
- C) 2:1
- D) 4:1
- ✓ nswer: B) 1:4

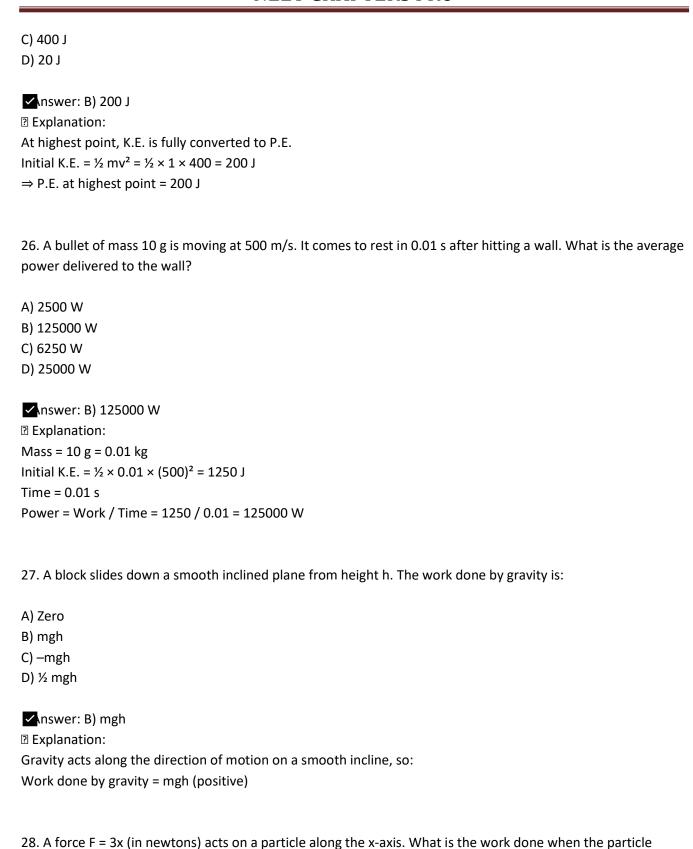
 ② Explanation:

 $K.E. = \frac{1}{2} \text{ mv}^2$

Ratio = $(\% \text{ m } v^2)$: $(\% \text{ m } (2v)^2)$ = v^2 : $4v^2$ = 1:4

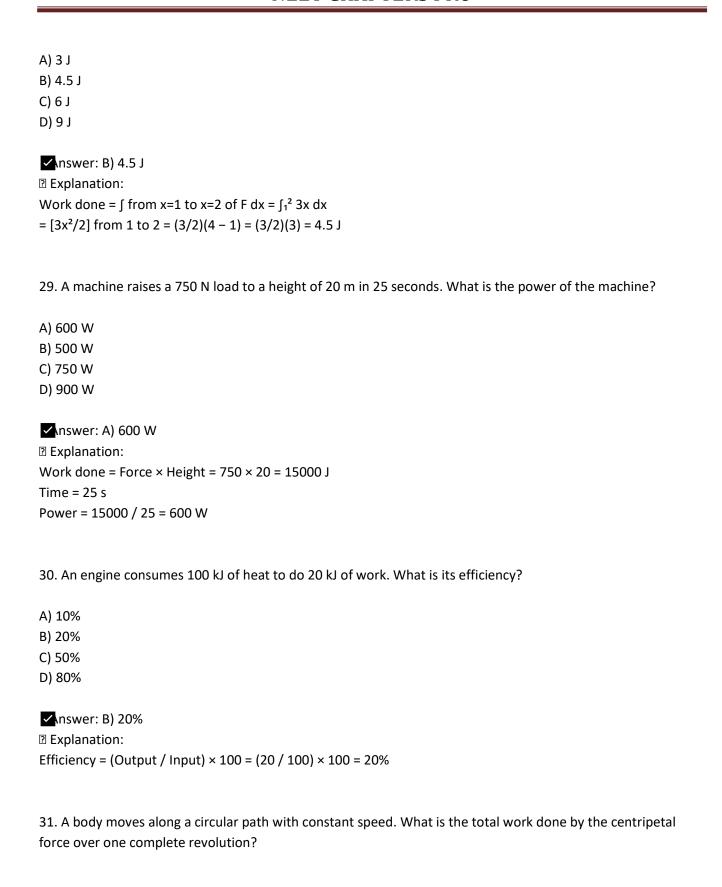
- 25. A body of mass 1 kg is thrown vertically upward with a velocity of 20 m/s. What is its potential energy at the highest point? (Take $g = 10 \text{ m/s}^2$)
- A) 100 J
- B) 200 J

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moves from x = 1 m to x = 2 m?



A) Positive B) Zero C) Negative D) Depends on radius
Inswer: B) Zero Explanation: Centripetal force is always perpendicular to displacement. Work = $F \times d \times cos(90^\circ) = 0 \Rightarrow Total \text{ work} = Zero$
32. The area under a force-displacement graph represents:
A) Acceleration B) Momentum C) Work done D) Power
✓nswer: C) Work done ② Explanation: Area under F—d graph = ∫ F dx = Work done
33. A 2 kg object falls freely from a height of 20 m. What is its speed just before hitting the ground? (Take $g = 10 \text{ m/s}^2$)
A) 10 m/s B) 20 m/s C) 40 m/s D) 25 m/s
Inswer: B) 20 m/s Explanation: From energy conservation: $mgh = \frac{1}{2} mv^2 \rightarrow 0$ $20 \times 10 = \frac{1}{2} \times v^2 \rightarrow v^2 = 400 \rightarrow v = 20 m/s$

34. The potential energy curve of a particle is shown to be minimum at x = 0. What can be said about the force acting on the particle at x = 0?

A) Force is zero B) Force is maximum C) Force is minimum D) Force is negative
✓nswer: A) Force is zero ② Explanation: Force F = -dU/dx At minimum potential energy, slope = 0 ⇒ Force is zero
35. Which of the following quantities is not conserved in an inelastic collision?
A) Linear momentum B) Energy C) Mass D) Kinetic energy
✓ Inswer: D) Kinetic energy ② Explanation: In inelastic collisions, kinetic energy is lost (converted to heat/sound etc.) But momentum and mass are conserved.
36. A conservative force field is acting on a particle. Which of the following must be true?
A) Work done depends on path B) Work done over a closed path is zero C) Energy is not conserved D) Force is always constant
✓ nswer: B) Work done over a closed path is zero ② Explanation: For conservative forces, work done in a closed loop is zero, and energy is conserved.
37. A particle is subjected to a conservative force. What happens to its mechanical energy?
A) Always increases B) Always decreases C) Remains constant

D,	Becomes	zero
$\boldsymbol{\nu}$	Decomes	2010

✓nswer: C) Remains constant

② Explanation:

In a conservative force field (e.g., gravity), Mechanical Energy = K.E. + P.E. = constant

- 38. If power delivered to a body is constant, what is the relation between force and velocity?
- A) Force is inversely proportional to velocity
- B) Force is directly proportional to velocity
- C) Force is constant
- D) Force varies as square of velocity
- ✓ nswer: A) Force is inversely proportional to velocity

② Explanation:

Power = $F \times v \Rightarrow$

If power is constant: $F \propto 1/v$

- 39. A block of mass m is moving on a smooth horizontal surface with speed v. It hits a spring with spring constant k and compresses it by a distance x before coming to rest. What is the maximum compression x of the spring?
- A) x = mv / k
- B) $x = mv^2 / 2k$
- C) $x = mv^2 / k$
- D) $x = \sqrt{(mv^2 / k)}$
- ✓ orrect Answer:
- $D) x = V(mv^2 / k)$

Explanation:

Initial kinetic energy of the block = (1/2)mv²

At maximum compression, all this energy is stored in the spring: Spring potential energy = $(1/2)kx^2$

By conservation of energy: $(1/2)mv^2 = (1/2)kx^2$
Cancel (1/2) from both sides: $mv^2 = kx^2$
So, $x^2 = mv^2 / k$
Therefore, $x = V(mv^2 / k)$
40. A ball dropped from height H reaches ground with speed v. If it is projected upward with the same speed v,
what maximum height will it reach?
A) H
B) 2H
C) H/2
D) vH
✓ nswer: A) H
② Explanation:
From energy conservation:
If $v = V(2gH)$, then going up with same v , it will reach height H again.
So, maximum height = H
M. A. very life and the confidence of the last control of the cont
41. A man lifts a box of 20 kg from the ground to his head, 2 meters high, in 2 seconds. His power output is: (g = $\frac{10 \text{ m/s}^2}{20 \text{ m}}$)
10 m/s²)
A) 100 W
B) 150 W
C) 200 W
D) 250 W
✓\nswer: C) 200 W
② Explanation:
Work = mgh = $20 \times 10 \times 2 = 400 \text{ J}$
Power = Work / Time = 400 / 2 = 200 W
42. A vehicle accelerates from rest to a velocity v in time t by applying constant power. How does its velocity
vary with time?
A) v ∝ t

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B) v ∝ √t

- C) $v \propto t^2$
- D) $v \propto 1/t$

✓answer: B) v ∝ √t

Explanation:

Power = $F \times v = ma \times v = m(dv/dt) \times v = m/2 \times d(v^2)/dt$

If P is constant, $v^2 \propto t \Rightarrow v \propto Vt$

43. A body is acted upon by a variable force $F = 6x^2$. What is the work done in moving it from x = 0 to x = 2 m?

- A) 8 J
- B) 16 J
- C) 24 J
- D) 32 J

✓ nswer: B) 16 J

Explanation:

 $W = \int_0^2 6x^2 dx = 6 \times \int_0^2 x^2 dx = 6 \times [x^3/3]_0^2 = 6 \times (8/3) = 16 J$

44. A boy throws a ball vertically upward. Which of the following is correct about energy at maximum height?

- A) K.E. = P.E.
- B) K.E. > P.E.
- C) K.E. = 0, P.E. maximum
- D) P.E. = 0, K.E. maximum

✓ Answer: C) K.E. = 0, P.E. maximum

② Explanation:

At maximum height, the body is momentarily at rest \Rightarrow K.E. = 0

All energy is stored as potential energy

45. In which of the following cases is maximum power delivered by a force?

- A) Force is perpendicular to velocity
- B) Force is zero
- C) Force is opposite to velocity
- D) Force is in the direction of velocity

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✓ nswer: D) Force is in the direction of velocity

② Explanation:

Power = $F \times v \times \cos\theta$

Maximum when θ = 0°, i.e., force and velocity are in same direction