PHYSICS MCQ BOOKLET

Grade 11 · Chapter 5 · Work and Kinetic Energy

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on work, force-displacement graphs, conservative and non-conservative forces, kinetic energy, work-energy theorem, resistive media, and efficiency. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. Work done on an object is defined as:

(A) F dot d = F d cos theta
(B) F cross d
(C) m v
(D) F / d

Correct Answer: A

Explanation: Work is the scalar product of force and displacement.

2. The SI unit of work is:

(A) newton
(B) joule (N m)
(C) watt
(D) kg m/s

Correct Answer: B

Explanation: The SI unit of work is joule (N m).

3. Only the component of force that does work along displacement is:

(A) F sin theta
(B) F tan theta
(C) F cos theta
(D) F / d

Correct Answer: C

Explanation: The effective component along displacement is F cos theta.

4. Work is positive when:

(A) theta = 180 only
(B) theta = 90 always
(C) force is zero
(D) 0 <= theta < 90 degrees (force has forward component)

Correct Answer: D

Explanation: Cos theta positive means force component along displacement.

5. Work is negative when:

(A) 90 < theta <= 180 degrees
(B) theta = 0
(C) theta = 90
(D) displacement is zero

Correct Answer: A

Explanation: Cos theta negative means force opposes displacement.

6. Work is zero when force is perpendicular to displacement because:

(A) sin 90 = 0
(B) cos 90 = 0
(C) F is infinite

(D) d is infinite

Correct Answer: B

Explanation: Work is zero when force is perpendicular to displacement because cos 90 = 0.

7. A weightlifter holding a barbell overhead without moving it does:

(A) positive work on the barbell
(B) negative work always
(C) zero work on the barbell (no displacement)
(D) infinite work

Correct Answer: C

Explanation: Without displacement, W = F d cos theta = 0 even if force is large.

8. Area under an F cos theta versus displacement graph equals:

(A) power
(B) acceleration
(C) momentum
(D) work done

Correct Answer: D

Explanation: Area under an F cos theta versus displacement graph equals work done.

9. For constant force parallel to displacement, work equals:

(A) area of rectangle on F-d graph
(B) area of triangle only
(C) zero
(D) F / d

Correct Answer: A

Explanation: For constant force parallel to displacement, work equals area of rectangle on F-d graph.

10. For force increasing linearly from zero with displacement, work equals:

(A) F d only
(B) area of triangle (1/2 F d)
(C) zero
(D) 2 F d always

Correct Answer: B

Explanation: Linear rise from origin gives triangular area half base times height.

11. Total work by several forces equals:

(A) product of forces
(B) zero always
(C) sum of individual works W1 + W2 + ...
(D) only the largest force times d

Correct Answer: C

Explanation: Work is scalar; add each force's contribution.

12. A 16.8 N pull at 30 degrees over 4.90 m does work about:

(A) 82 J
(B) 0 J
(C) 16 J
(D) 71 J

Correct Answer: D

Explanation: A 16.8 N pull at 30 degrees over 4.90 m does work about 71 J.

13. Friction 0.170 N opposite motion over 4.90 m does work about:

(A) -0.83 J
(B) +0.83 J
(C) 0 J

(D) 71 J

Correct Answer: A

Explanation: Friction 0.170 N opposite motion over 4.90 m does work about -0.83 J.

14. Net work on the suitcase (71 J pull, -0.83 J friction) is about:

(A) 72 J
(B) 70.5 J
(C) 0 J
(D) -71 J

Correct Answer: B

Explanation: Net work on the suitcase (71 J pull, -0.83 J friction) is about 70.5 J.

15. A conservative field is one where work between two points:

(A) always depends on path
(B) is always infinite
(C) depends only on endpoints, not path
(D) is never defined

Correct Answer: C

Explanation: Gravity and electric fields are path-independent for work.

16. Work done around a closed path in a conservative field is:

(A) always positive
(B) always m g h
(C) infinite
(D) zero

Correct Answer: D

Explanation: Work done around a closed path in a conservative field is zero.

17. Examples of conservative fields include:

(A) gravitational and electric fields
(B) kinetic friction only
(C) air drag only
(D) viscous drag in all cases as non-conservative only

Correct Answer: A

Explanation: Gravity and electrostatic forces are conservative.

18. Non-conservative forces include:

(A) gravity near Earth
(B) kinetic friction and air resistance
(C) spring force
(D) electrostatic force

Correct Answer: B

Explanation: Non-conservative forces include kinetic friction and air resistance.

19. Non-conservative forces can:

(A) never affect energy
(B) create energy from nothing
(C) change total mechanical energy (convert KE to heat)
(D) only do positive work

Correct Answer: C

Explanation: Non-conservative forces can change total mechanical energy (convert KE to heat).

20. Kinetic energy is energy due to:

(A) height only
(B) temperature only
(C) charge only

(D) motion

Correct Answer: D

Explanation: Kinetic energy is energy due to motion.

21. Kinetic energy formula is:

(A) (1/2) m v^2
(B) m g h
(C) F d only
(D) m v

Correct Answer: A

Explanation: Kinetic energy formula is (1/2) m v^2.

22. Kinetic energy is a:

(A) vector
(B) scalar
(C) unitless number only
(D) force

Correct Answer: B

Explanation: Kinetic energy is a scalar.

23. A 1 kg ball at 2 m/s has kinetic energy:

(A) 4 J
(B) 1 J
(C) 2 J
(D) 0.5 J

Correct Answer: C

Explanation: A 1 kg ball at 2 m/s has kinetic energy 2 J.

24. If speed doubles (same mass), kinetic energy becomes:

(A) double
(B) half
(C) unchanged
(D) four times

Correct Answer: D

Explanation: If speed doubles (same mass), kinetic energy becomes four times.

25. If speed halves, kinetic energy becomes:

(A) one fourth
(B) half
(C) double
(D) zero

Correct Answer: A

Explanation: If speed halves, kinetic energy becomes one fourth.

26. Object A has twice the speed of B (same mass). KE of A compared to B is:

(A) twice
(B) four times
(C) equal
(D) half

Correct Answer: B

Explanation: Object A has twice the speed of B (same mass). KE of A compared to B is four times.

27. Work-energy theorem states:

(A) W = m g always
(B) KE = F only
(C) W_net = change in kinetic energy

(D) W = zero always

Correct Answer: C

Explanation: Work-energy theorem states W_net = change in kinetic energy.

28. To stop a 1500 kg car at 40 km/h, work needed equals loss of:

(A) zero
(B) potential energy only
(C) mass times g
(D) its initial kinetic energy

Correct Answer: D

Explanation: Brakes must do negative work equal to initial KE.

29. 40 km/h is about 11.1 m/s. KE of 1500 kg at that speed is about:

(A) 92.6 kJ
(B) 600 J
(C) 1500 J
(D) 40 kJ

Correct Answer: A

Explanation: KE = (1/2)(1500)(11.1)^2 is about 92.6 kJ.

30. Deriving KE uses:

(A) only P = F v
(B) W = F d, F = ma, and v^2 = vi^2 + 2 a d
(C) only momentum
(D) only torque

Correct Answer: B

Explanation: Deriving KE uses W = F d, F = ma, and v^2 = vi^2 + 2 a d.

31. In a resistive medium, applied work equals:

(A) only KE gain always
(B) zero
(C) gain in KE plus work against resistive force
(D) only resistive work

Correct Answer: C

Explanation: W = delta KE + Wr when friction or drag is present.

32. Work against resistive force Wr equals:

(A) W plus KE
(B) m g h only
(C) always zero
(D) W applied minus change in KE

Correct Answer: D

Explanation: Energy not stored as KE goes into overcoming resistance.

33. A 100 g ball dropped 30 m with 0.4 N air resistance: KE just before ground is about:

(A) 17.4 J
(B) 29.4 J
(C) 0 J
(D) 30 J

Correct Answer: A

Explanation: A 100 g ball dropped 30 m with 0.4 N air resistance: KE just before ground is about 17.4 J.

34. Gravitational potential energy near Earth is:

(A) (1/2) m v^2
(B) m g h
(C) F d cos 90

(D) zero always

Correct Answer: B

Explanation: Gravitational potential energy near Earth is m g h.

35. Mechanical energy often means:

(A) heat only
(B) chemical energy only
(C) KE plus PE (for conservative forces)
(D) power

Correct Answer: C

Explanation: Mechanical energy often means KE plus PE (for conservative forces).

36. Efficiency of a machine is:

(A) input / output
(B) always 1
(C) mass / time
(D) useful output / input (often as percentage)

Correct Answer: D

Explanation: Efficiency of a machine is useful output / input (often as percentage).

37. Efficiency has:

(A) no units (a ratio)
(B) unit joule
(C) unit newton
(D) unit watt only

Correct Answer: A

Explanation: Output and input are both energy, so the ratio is dimensionless.

38. An ideal machine has efficiency:

(A) 0%
(B) 100% (1)
(C) 50% always
(D) negative

Correct Answer: B

Explanation: No losses means output equals input.

39. Real machines have efficiency:

(A) greater than 100%
(B) exactly 200%
(C) less than 100%
(D) undefined

Correct Answer: C

Explanation: Real machines have efficiency less than 100%.

40. Engine with 600 J input and 150 J useful work has efficiency:

(A) 50%
(B) 75%
(C) 100%
(D) 25%

Correct Answer: D

Explanation: Engine with 600 J input and 150 J useful work has efficiency 25%.

41. Car engine 25% efficient producing 50 kJ useful work consumed fuel energy:

(A) 200 kJ
(B) 50 kJ
(C) 12.5 kJ

(D) 500 kJ

Correct Answer: A

Explanation: Car engine 25% efficient producing 50 kJ useful work consumed fuel energy 200 kJ.

42. Machine A 40% and B 60% each get 500 J input. B does how much more useful work than A?

(A) 200 J
(B) 100 J
(C) 50 J
(D) 300 J

Correct Answer: B

Explanation: 100 J — this correctly answers the question.

43. Wind turbine 30% efficient with 900 J wind KE produces electrical energy:

(A) 900 J
(B) 630 J
(C) 270 J
(D) 30 J

Correct Answer: C

Explanation: Wind turbine 30% efficient with 900 J wind KE produces electrical energy 270 J.

44. Typical automobile engine efficiency is about:

(A) 98%
(B) 95%
(C) 100%
(D) 25%

Correct Answer: D

Explanation: Typical automobile engine efficiency is about 25%.

45. Typical electric generator efficiency is about:

(A) 98%
(B) 5%
(C) 25%
(D) 40%

Correct Answer: A

Explanation: Generators convert mechanical to electrical with very high efficiency.

46. Incandescent light bulb efficiency is about:

(A) 95%
(B) 5%
(C) 98%
(D) 50%

Correct Answer: B

Explanation: Incandescent light bulb efficiency is about 5%.

47. If force and displacement units each increase 5 times, work unit increases:

(A) 5 times
(B) 10 times
(C) 25 times
(D) 0 times

Correct Answer: C

Explanation: Work is force times distance, so 5 x 5 = 25.

48. Centripetal force on uniform circular motion does work per revolution:

(A) m v squared / r always positive
(B) infinite
(C) m g h

(D) zero (perpendicular to displacement each instant)

Correct Answer: D

Explanation: Centripetal force is perpendicular to instantaneous displacement.

49. Work done lifting 40 kg vertically 8 m against gravity (g = 9.8) is about:

(A) 3136 J
(B) 320 J
(C) 40 J
(D) 0 J

Correct Answer: A

Explanation: Work done lifting 40 kg vertically 8 m against gravity (g = 9.8) is about 3136 J.

50. Work done by gravity moving 1500 kg car down a 2 m ramp at 30 degrees (vertical drop 1 m) for mg component:

(A) always zero
(B) depends on path for friction; gravity work depends on vertical height
(C) always infinite
(D) independent of height

Correct Answer: B

Explanation: Work done by gravity moving 1500 kg car down a 2 m ramp at 30 degrees (vertical drop 1 m) for mg component depends on path for friction; gravity work depends on vertical height.

51. 1200 kg car at 20 m/s has kinetic energy:

(A) 24 kJ
(B) 2400 J
(C) 240 kJ
(D) 120 kJ

Correct Answer: C

Explanation: 1200 kg car at 20 m/s has kinetic energy 240 kJ.

52. Same car stops in 50 m. Average braking force is about:

(A) 2400 N
(B) 480 N
(C) 24000 N
(D) 4800 N

Correct Answer: D

Explanation: Same car stops in 50 m. Average braking force is about 4800 N.

53. 500 kg coaster at 30 m height with 5 m/s at top: PE + KE total about:

(A) 153250 J
(B) 50000 J
(C) 147000 J only
(D) 6250 J only

Correct Answer: A

Explanation: 500 kg coaster at 30 m height with 5 m/s at top: PE + KE total about 153250 J.

54. If that coaster descends with no friction, speed at bottom is about:

(A) 5 m/s
(B) 24.75 m/s
(C) 30 m/s
(D) 0 m/s

Correct Answer: B

Explanation: If that coaster descends with no friction, speed at bottom is about 24.75 m/s.

55. Kinetic energy can be:

(A) negative when moving left

(B) negative at high speed
(C) never negative
(D) always zero

Correct Answer: C

Explanation: v squared is never negative, so KE >= 0.

56. Work can be:

(A) only positive
(B) only negative
(C) never zero
(D) positive, negative, or zero

Correct Answer: D

Explanation: Work can be positive, negative, or zero.

57. Moon revolving around Earth: gravity does net work per orbit:

(A) zero (closed path in conservative field)
(B) positive always
(C) negative always
(D) infinite

Correct Answer: A

Explanation: Moon revolving around Earth: gravity does net work per orbit zero (closed path in conservative field).

58. Stretching a spring: force is variable, so work is found from:

(A) F d with constant F only
(B) area under F-d graph
(C) zero always
(D) m v squared only

Correct Answer: B

Explanation: Spring force grows with extension; integrate or use graph area.

59. Rocket work against gravity varies with distance because:

(A) mass becomes zero
(B) g increases with height
(C) gravity weakens with distance (non-uniform field at large scale)
(D) no work is ever done

Correct Answer: C

Explanation: Inverse-square gravity makes force variable far from Earth.

60. Chemical energy in muscles for weightlifting comes partly from:

(A) nuclear fusion in the body
(B) solar panels
(C) magnetic fields
(D) ATP and glycogen/glucose breakdown

Correct Answer: D

Explanation: Metabolic processes supply energy for muscular work.

61. Power is not the same as work; power is:

(A) work per unit time
(B) force only
(C) energy times time
(D) mass times velocity

Correct Answer: A

Explanation: Power measures how fast work is done (introduced elsewhere but contrast helps).

62. When brakes fail on level road, stopping requires removing:

(A) only potential energy

(B) kinetic energy
(C) no energy
(D) mass

Correct Answer: B

Explanation: Without friction, KE must be removed by another force doing negative work.

63. Lifting a box at constant speed: net work is:

(A) always infinite
(B) negative only
(C) zero (lifting work cancels gravity work over round trip; during lift, applied work equals m g h)
(D) undefined

Correct Answer: C

Explanation: At constant speed net force is zero; applied force equals weight.

64. Work done against gravity lifting mass m through height h is:

(A) zero
(B) (1/2) m v^2
(C) F sin theta only
(D) m g h

Correct Answer: D

Explanation: Work done against gravity lifting mass m through height h is m g h.

65. If net work on an object is positive, its kinetic energy:

(A) increases
(B) decreases
(C) must be zero
(D) becomes negative

Correct Answer: A

Explanation: If net work on an object is positive, its kinetic energy increases.

66. If net work is negative, kinetic energy:

(A) increases
(B) decreases
(C) stays infinite
(D) becomes undefined

Correct Answer: B

Explanation: If net work is negative, kinetic energy decreases.

67. Two objects same mass: football faster has:

(A) same KE always
(B) less KE
(C) greater kinetic energy
(D) zero KE

Correct Answer: C

Explanation: At same mass, larger v means larger KE.

68. Two objects same speed: heavier football has:

(A) less KE
(B) zero KE
(C) same KE regardless of mass
(D) greater kinetic energy

Correct Answer: D

Explanation: Two objects same speed: heavier football has greater kinetic energy.

69. Water rocket total energy 2352 J, mass 3 kg: launch speed from (1/2)mv^2 = E is about:

(A) 39.6 m/s

(B) 20 m/s
(C) 80 m/s
(D) 9.8 m/s

Correct Answer: A

Explanation: Water rocket total energy 2352 J, mass 3 kg: launch speed from (1/2)mv^2 = E is about 39.6 m/s.

70. Same rocket maximum height from m g h = E is about:

(A) 2352 m
(B) 80 m
(C) 30 m
(D) 3 m

Correct Answer: B

Explanation: Same rocket maximum height from m g h = E is about 80 m.

71. Refrigerator 600 W for 1 h with 15% efficiency gives useful cooling energy about:

(A) 600 J
(B) 2160 kJ
(C) 324 kJ
(D) 90 kJ

Correct Answer: C

Explanation: Input = 600 x 3600 J; 15% is 324 kJ.

72. Odd one out as non-conservative:

(A) gravitational force
(B) elastic spring force (ideal)
(C) electric force
(D) frictional force

Correct Answer: D

Explanation: Friction is non-conservative; others listed are conservative.

73. Vertical climb 10 m with 500 J work done by lifter: energy change of body (ignoring KE change) is about:

(A) 500 J increase in gravitational PE
(B) zero
(C) -500 J always
(D) 50 J

Correct Answer: A

Explanation: Work against gravity stores 500 J as increased PE.

74. Skydiver at terminal velocity: net work per instant may be zero because:

(A) gravity vanishes
(B) weight and drag balance; no KE change at constant speed
(C) mass is zero
(D) no forces act

Correct Answer: B

Explanation: At terminal speed forces balance and velocity is constant.

75. Work-energy theorem is often easier than Newton's laws when:

(A) mass is zero
(B) no displacement occurs
(C) force is not constant (variable force)
(D) only static equilibrium

Correct Answer: C

Explanation: Work-energy theorem is often easier than Newton's laws when force is not constant (variable force).

76. Efficiency of fossil fuel power plant is roughly:

(A) 98%
(B) 5%
(C) 95%
(D) 40%

Correct Answer: D

Explanation: Efficiency of fossil fuel power plant is roughly 40%.

77. Hydroelectric plant efficiency is roughly:

(A) 95%
(B) 5%
(C) 25%
(D) 20%

Correct Answer: A

Explanation: Hydro is among the most efficient conversions listed.

78. A 2 kg block slides on frictionless ice at 4 m/s. Its kinetic energy is:

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

Correct Answer: B

Explanation: A 2 kg block slides on frictionless ice at 4 m/s. Its kinetic energy is 16 J.

79. Work done lifting a 5 kg book 1.2 m vertically at constant speed (g = 10 m/s^2) is:

(A) 50 J
(B) 12 J
(C) 60 J
(D) 600 J

Correct Answer: C

Explanation: Work done lifting a 5 kg book 1.2 m vertically at constant speed (g = 10 m/s^2) is 60 J.

80. A force does 120 J of work in 4 s. Average power is:

(A) 480 W
(B) 0.033 W
(C) 124 W
(D) 30 W

Correct Answer: D

Explanation: A force does 120 J of work in 4 s. Average power is 30 W.

B. Less Important / Secondary Topics

81. Work is a scalar because it comes from:

(A) dot product of two vectors
(B) cross product
(C) vector sum of forces
(D) unit vectors only

Correct Answer: A

Explanation: Work is a scalar because it comes from dot product of two vectors.

82. Perpendicular force component F sin theta:

(A) does all the work
(B) does no work on displacement along d
(C) equals m g h
(D) is always zero force

Correct Answer: B

Explanation: Perpendicular force component F sin theta does no work on displacement along d.

83. James Prescott Joule showed heat is:

(A) a weightless fluid
(B) unrelated to mechanical work
(C) a form of energy transfer
(D) only chemical

Correct Answer: C

Explanation: James Prescott Joule showed heat is a form of energy transfer.

84. Variable force work can be approximated by splitting displacement into:

(A) one large jump only
(B) zero segments
(C) angles only
(D) many small segments and summing F cos theta Delta d

Correct Answer: D

Explanation: Variable force work can be approximated by splitting displacement into many small segments and summing F cos theta Delta d.

85. Conservative force examples for PE definition:

(A) gravity and ideal spring
(B) kinetic friction
(C) air drag
(D) rubbing hands

Correct Answer: A

Explanation: PE is defined for forces where work is path-independent.

86. Path II vs Path I between same points in gravity: work by gravity is:

(A) always different
(B) the same
(C) zero on both
(D) infinite on Path II

Correct Answer: B

Explanation: Path II vs Path I between same points in gravity: work by gravity is the same.

87. Closed loop work by friction is:

(A) always zero
(B) always m g h
(C) not zero (non-conservative)
(D) undefined

Correct Answer: C

Explanation: Friction dissipates energy every step; closed path work is negative net.

88. KE at rest is:

(A) negative
(B) (1/2)m
(C) m g h
(D) zero

Correct Answer: D

Explanation: KE at rest is zero.

89. Stopping distance depends on:

(A) initial KE and braking force
(B) colour of car
(C) only mass
(D) only time

Correct Answer: A

Explanation: Stopping distance depends on initial KE and braking force.

90. Engine A more efficient than B at same power output:

(A) must be heavier always
(B) uses less fuel (less wasted heat)
(C) produces less power
(D) efficiency unrelated to fuel

Correct Answer: B

Explanation: Higher efficiency means less input for same useful output.

91. Ball A speed 2v, ball B speed v, same mass: KE ratio A:B is:

(A) 2:1
(B) 1:1
(C) 4:1
(D) 1:2

Correct Answer: C

Explanation: Ball A speed 2v, ball B speed v, same mass: KE ratio A:B is 4:1.

92. Crane drops 5000 kg from 12 m: KE just before ground (no air) is:

(A) zero
(B) 5000 J
(C) 12 J
(D) m g h = about 588 kJ

Correct Answer: D

Explanation: Crane drops 5000 kg from 12 m: KE just before ground (no air) is m g h = about 588 kJ.

93. Pulley ideal efficiency 100% means:

(A) input work equals output work
(B) output is zero
(C) input is zero
(D) no load lifted

Correct Answer: A

Explanation: Pulley ideal efficiency 100% means input work equals output work.

94. Real pulley might be 40% efficient meaning:

(A) output exceeds input
(B) 60% of input is lost, often as heat
(C) efficiency over 100%
(D) no friction exists

Correct Answer: B

Explanation: Real pulley might be 40% efficient meaning 60% of input is lost, often as heat.

95. Work done by normal force on horizontal floor while walking:

(A) m g h
(B) always positive
(C) zero (perpendicular to displacement)
(D) F d with theta 0

Correct Answer: C

Explanation: Normal force is vertical; horizontal displacement gives zero work.

96. Carrying a backpack horizontally at constant height: work by gravity on the pack is:

(A) positive
(B) negative
(C) m g d horizontal
(D) zero (vertical force, horizontal displacement)

Correct Answer: D

Explanation: Gravity is vertical; horizontal carry does zero work on pack.

97. Applied force at 90 degrees to displacement does:

(A) zero work
(B) maximum work
(C) negative work always
(D) infinite work

Correct Answer: A

Explanation: Applied force at 90 degrees to displacement does zero work.

98. Doubling both mass and speed multiplies KE by:

(A) 2 times
(B) 8 times (2 mass x 4 speed factor)
(C) 4 times
(D) 16 times

Correct Answer: B

Explanation: Doubling both mass and speed multiplies KE by 8 times (2 mass x 4 speed factor).

99. Mechanical energy conserved when:

(A) friction is large
(B) non-conservative forces act
(C) only conservative forces do work
(D) always never

Correct Answer: C

Explanation: Mechanical energy conserved when only conservative forces do work.

100. Air resistance on falling ball reduces:

(A) mass
(B) g
(C) time always to zero
(D) final KE compared with vacuum drop

Correct Answer: D

Explanation: Air resistance on falling ball reduces final KE compared with vacuum drop.

101. Efficiency cannot exceed 100% because:

(A) some energy always becomes unusable forms like heat
(B) laws forbid any output
(C) input is always zero
(D) machines create energy

Correct Answer: A

Explanation: Efficiency cannot exceed 100% because some energy always becomes unusable forms like heat.

102. Work and energy have the same SI unit because:

(A) they are unrelated
(B) work transfers energy
(C) work is force only
(D) energy is force

Correct Answer: B

Explanation: Work and energy have the same SI unit because work transfers energy.

103. Lifting 40 kg box 8 m on frictionless incline 20 degrees: work against gravity equals:

(A) zero on incline
(B) only along slope with no vertical
(C) m g h = about 3136 J (depends on vertical 8 m)
(D) 40 x 8 only

Correct Answer: C

Explanation: Lifting 40 kg box 8 m on frictionless incline 20 degrees: work against gravity equals m g h = about 3136 J (depends on vertical 8 m).

104. Force acting but zero displacement after some time means:

(A) infinite work
(B) negative KE
(C) positive KE always
(D) zero work for that interval

Correct Answer: D

Explanation: W requires displacement; no movement means no work.

105. Non-conservative forces on a body:

(A) can change total mechanical energy
(B) cannot change KE ever
(C) always conserve PE
(D) make work path-independent

Correct Answer: A

Explanation: They remove or add mechanical energy as heat/deformation.

106. Electric force field is:

(A) always non-conservative
(B) conservative
(C) never does work
(D) only vertical

Correct Answer: B

Explanation: Electrostatic work is path-independent.

107. Elastic force (ideal spring) is:

(A) non-conservative like friction
(B) never stores energy
(C) conservative
(D) only thermal

Correct Answer: C

Explanation: Spring PE is recoverable; work is path-independent.

108. Wind generator typical efficiency in table is about:

(A) 98%
(B) 5%
(C) 25%
(D) 55%

Correct Answer: D

Explanation: Wind generator typical efficiency in table is about 55%.