PHYSICS MCQ BOOKLET

Grade 11 · Chapter 3 · Translatory Motion

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on uniformly accelerated motion, free fall, projectile motion, air resistance, momentum conservation, and elastic/inelastic collisions. 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. Kinematics is the study of motion:

(A) without considering the causes of motion
(B) including the forces that cause it
(C) only for rotating objects
(D) only for vibrating objects

Correct Answer: A

Explanation: Kinematics is the study of motion without considering the causes of motion.

2. Dynamics deals mainly with:

(A) graphs of motion only
(B) the forces that cause motion
(C) units of length only
(D) temperature change

Correct Answer: B

Explanation: Dynamics links forces to the motion of objects and systems.

3. Translatory motion means the object:

(A) spins about a fixed axis
(B) oscillates about a mean position only
(C) moves as a whole from one place to another
(D) stays at rest always

Correct Answer: C

Explanation: Translation is change of position of the body as a whole, unlike rotation or vibration.

4. The three standard equations of uniformly accelerated motion assume:

(A) acceleration always increases
(B) the path is a circle
(C) air resistance is the driving force
(D) acceleration is constant and motion is along a straight line

Correct Answer: D

Explanation: The usual v-t-S relations hold for constant acceleration in a straight line.

5. The first equation of motion is:

(A) vf = vi + at
(B) S = vi t
(C) 2aS = vf + vi
(D) S = at

Correct Answer: A

Explanation: The first equation of motion is vf = vi + at.

6. The second equation of motion is:

(A) vf = vi + at
(B) S = vi t + (1/2) a t^2
(C) 2aS = vf^2 + vi^2

(D) S = vf t

Correct Answer: B

Explanation: Displacement comes from initial motion plus the extra distance due to acceleration.

7. The third equation of motion is:

(A) S = vt
(B) vf = S/t
(C) 2aS = vf^2 - vi^2
(D) a = S t

Correct Answer: C

Explanation: The third equation of motion is 2aS = vf^2 - vi^2.

8. On a velocity-time graph, the slope of a straight line equals:

(A) displacement
(B) mass
(C) force
(D) acceleration

Correct Answer: D

Explanation: Acceleration is change of velocity per time, which is the slope of the v-t graph.

9. The area under a velocity-time graph equals:

(A) displacement (distance along the line of motion)
(B) acceleration
(C) mass
(D) power

Correct Answer: A

Explanation: Velocity times time is distance; the area under v versus t therefore gives displacement.

10. If a body starts from rest and accelerates uniformly, vf after time t is:

(A) a/t
(B) at
(C) t/a
(D) zero always

Correct Answer: B

Explanation: If a body starts from rest and accelerates uniformly, vf after time t is at.

11. A car with vi = 4 m/s accelerates at 1 m/s^2 for 10 s. Distance travelled is:

(A) 40 m
(B) 50 m
(C) 90 m
(D) 14 m

Correct Answer: C

Explanation: A car with vi = 4 m/s accelerates at 1 m/s^2 for 10 s. Distance travelled is 90 m.

12. A body with vi = 10 m/s and a = 2 m/s^2 has vf after 5 s equal to:

(A) 12 m/s
(B) 50 m/s
(C) 10 m/s
(D) 20 m/s

Correct Answer: D

Explanation: A body with vi = 10 m/s and a = 2 m/s^2 has vf after 5 s equal to 20 m/s.

13. Uniform retardation means:

(A) speed decreases at a constant rate
(B) speed increases at a constant rate
(C) acceleration is zero

(D) direction keeps reversing

Correct Answer: A

Explanation: Retardation is constant negative acceleration that slows the object.

14. If a train slows from 80 km/h to 20 km/h with constant retardation, the correct first step is to:

(A) ignore units
(B) convert speeds to m/s then use vf = vi + at
(C) use only S = vt
(D) assume a = g

Correct Answer: B

Explanation: SI units must match; then the first.

15. Free-fall near Earth (no air resistance) has acceleration of magnitude about:

(A) 1 m/s^2
(B) zero
(C) 9.8 m/s^2 toward Earth's centre
(D) 3 x 10^8 m/s^2

Correct Answer: C

Explanation: g is about 9.8 m/s^2 downward for all objects if air is neglected.

16. In vacuum, a heavy stone and a light pebble dropped together:

(A) hit at different times because of mass
(B) float
(C) the pebble falls faster
(D) hit together because g does not depend on mass

Correct Answer: D

Explanation: Gravitational acceleration is independent of mass when air resistance is absent.

17. Equations of free fall are obtained from the usual motion equations by putting:

(A) a = g and S = h
(B) a = 0
(C) t = 0
(D) vf = vi

Correct Answer: A

Explanation: Equations of free fall are obtained from the usual motion equations by putting a = g and S = h.

18. At the highest point of a vertical throw, vertical velocity is:

(A) maximum
(B) zero
(C) equal to g
(D) undefined

Correct Answer: B

Explanation: The object stops rising for an instant before falling; speed is briefly zero.

19. While a ball thrown upward is still going up, velocity and acceleration are:

(A) in the same direction
(B) both zero
(C) in opposite directions
(D) perpendicular always

Correct Answer: C

Explanation: Velocity is upward while g is downward, so they are opposite.

20. While the same ball is coming down, velocity and acceleration are:

(A) opposite
(B) both zero
(C) horizontal

(D) in the same downward direction

Correct Answer: D

Explanation: While the same ball is coming down, velocity and acceleration are in the same downward direction.

21. Projectile motion (no air) is 2-D motion under:

(A) gravity only after launch
(B) constant horizontal acceleration
(C) a continuous engine force
(D) magnetic force

Correct Answer: A

Explanation: After launch, the only acceleration is g vertically.

22. Horizontal and vertical parts of projectile motion are:

(A) always equal
(B) completely independent
(C) both accelerated by g
(D) both at constant speed

Correct Answer: B

Explanation: Horizontal and vertical parts of projectile motion are completely independent.

23. For a projectile with no air resistance, horizontal velocity is:

(A) increasing
(B) decreasing
(C) constant
(D) always zero

Correct Answer: C

Explanation: No horizontal force means ax = 0, so vx stays constant.

24. Vertical acceleration of a projectile (no air) is:

(A) zero
(B) g horizontal
(C) variable randomly
(D) g downward

Correct Answer: D

Explanation: Vertical acceleration of a projectile (no air) is g downward.

25. A ball dropped and a ball thrown horizontally from the same height (no air) hit the ground:

(A) at the same time
(B) at different times
(C) never
(D) the thrown ball later always by 10 s

Correct Answer: A

Explanation: Both fall the same vertical distance from rest in the y-direction.

26. For a projectile launched horizontally from a cliff, initial vertical velocity is:

(A) equal to launch speed
(B) zero
(C) g
(D) infinite

Correct Answer: B

Explanation: For a projectile launched horizontally from a cliff, initial vertical velocity is zero.

27. Time to fall from height h with viy = 0 is found from:

(A) h = v t only
(B) h = g/t
(C) h = (1/2) g t^2

(D) t = h g

Correct Answer: C

Explanation: With no initial downward speed, drop distance is (1/2)gt^2.

28. A projectile launched at angle theta has initial components:

(A) vx = vi sin theta, vy = vi cos theta
(B) vx = vi, vy = vi
(C) vx = 0, vy = vi
(D) vx = vi cos theta, vy = vi sin theta

Correct Answer: D

Explanation: A projectile launched at angle theta has initial components vx = vi cos theta, vy = vi sin theta.

29. At the top of an angled projectile path, the vertical velocity is:

(A) zero
(B) maximum
(C) equal to vx
(D) equal to vi

Correct Answer: A

Explanation: At the top of an angled projectile path, the vertical velocity is zero.

30. At the top of the path, the speed of a projectile (no air) equals:

(A) zero
(B) the horizontal component vi cos theta
(C) vi
(D) g t

Correct Answer: B

Explanation: vy = 0 at the peak, so speed is just |vx|.

31. Maximum height of a projectile on level ground is:

(A) H = vi / g
(B) H = (vi^2) / g
(C) H = (vi^2 sin^2 theta) / (2g)
(D) H = 2 vi sin theta

Correct Answer: C

Explanation: Maximum height of a projectile on level ground is H = (vi^2 sin^2 theta) / (2g).

32. Time of flight on level ground is:

(A) T = (vi sin theta) / g
(B) T = (vi cos theta) / g
(C) T = 2g / vi
(D) T = (2 vi sin theta) / g

Correct Answer: D

Explanation: The projectile returns when vertical displacement is zero, doubling the time to the peak.

33. Time to reach the summit is:

(A) T/2 = (vi sin theta)/g
(B) full flight time T
(C) 2T
(D) independent of vi

Correct Answer: A

Explanation: Time to reach the summit is T/2 = (vi sin theta)/g.

34. Horizontal range on level ground is:

(A) R = vi / g
(B) R = (vi^2 sin 2theta) / g
(C) R = (vi sin theta) / g

(D) R = 2g / vi^2

Correct Answer: B

Explanation: R = (vi cos theta) times total flight time, which simplifies using 2 sin theta cos theta = sin 2theta.

35. For a given launch speed, range is maximum when theta is:

(A) 0 degrees
(B) 30 degrees
(C) 45 degrees
(D) 90 degrees

Correct Answer: C

Explanation: sin 2theta is 1 when 2theta = 90 degrees, so theta = 45 degrees.

36. Maximum range for speed vi on level ground is:

(A) Rmax = 2 vi / g
(B) Rmax = vi g
(C) Rmax = g / vi^2
(D) Rmax = vi^2 / g

Correct Answer: D

Explanation: Maximum range for speed vi on level ground is Rmax = vi^2 / g.

37. Complementary launch angles that give the same range include:

(A) 30 degrees and 60 degrees
(B) 0 degrees and 45 degrees
(C) 90 degrees and 90 degrees
(D) 10 degrees and 10 degrees

Correct Answer: A

Explanation: Complementary launch angles that give the same range include 30 degrees and 60 degrees.

38. Compared with 30 degrees, a 60-degree launch (same vi) has:

(A) greater range always
(B) the same range but greater maximum height
(C) zero height
(D) no flight time

Correct Answer: B

Explanation: Compared with 30 degrees, a 60-degree launch (same vi) has the same range but greater maximum height.

39. Air resistance typically:

(A) increases range and height
(B) removes gravity
(C) reduces range and maximum height
(D) makes vx increase

Correct Answer: C

Explanation: Drag removes energy, so the projectile neither goes as far nor as high.

40. With air resistance the path is often:

(A) a taller symmetric parabola
(B) a perfect circle
(C) a straight line up
(D) shorter, with a steeper descent

Correct Answer: D

Explanation: Horizontal speed keeps falling, so the landing side is steeper than the rise.

41. After launch, in the absence of air, the force on a projectile is:

(A) gravity only
(B) the launch push continuing

(C) nuclear force
(D) a contact force from air always

Correct Answer: A

Explanation: The launching force acts only at the start; afterwards weight is the force.

42. Instantaneous speed of a projectile is:

(A) vfx + vfy
(B) sqrt(vfx^2 + vfy^2)
(C) vfy only
(D) always vi

Correct Answer: B

Explanation: Instantaneous speed of a projectile is sqrt(vfx^2 + vfy^2).

43. Direction of instantaneous velocity is:

(A) always the launch angle
(B) always 0
(C) theta = tan^−1(vfy / vfx)
(D) always 90 degrees

Correct Answer: C

Explanation: The velocity vector's tilt is the inverse tangent of vy over vx.

44. Horizontal displacement at time t is:

(A) x = (1/2) g t^2
(B) x = vi sin theta
(C) x = g t
(D) x = (vi cos theta) t

Correct Answer: D

Explanation: Horizontal displacement at time t is x = (vi cos theta) t.

45. Vertical displacement (up positive) is:

(A) y = (vi sin theta)t − (1/2)gt^2
(B) y = (vi cos theta)t
(C) y = g t
(D) y = 0 always

Correct Answer: A

Explanation: Vertical motion is uniformly accelerated by −g.

46. Momentum of a body is:

(A) m / v
(B) m v
(C) m + v
(D) v / m

Correct Answer: B

Explanation: Linear momentum is mass times velocity.

47. A 4 kg object with momentum 12 kg m/s has speed:

(A) 4 m/s
(B) 12 m/s
(C) 3 m/s
(D) 48 m/s

Correct Answer: C

Explanation: A 4 kg object with momentum 12 kg m/s has speed 3 m/s.

48. In an isolated system, total momentum:

(A) always increases
(B) always becomes zero

(C) depends only on heat
(D) is conserved

Correct Answer: D

Explanation: If net external force is zero, Pi = Pf.

49. Conservation of momentum is written as:

(A) Delta p = 0
(B) Delta p = m g
(C) p = m a
(D) p = F t^2

Correct Answer: A

Explanation: Change of total momentum of an isolated system is zero.

50. Momentum can stay conserved even if kinetic energy changes because:

(A) energy is never conserved
(B) internal forces may convert KE to heat or deformation while still summing to zero impulse internally
(C) mass disappears
(D) velocity is scalar

Correct Answer: B

Explanation: Internal collision forces cancel in pairs; KE can still be lost to heat or shape change.

51. In an explosion of a bomb initially at rest, the fragments' total momentum is:

(A) large and forward
(B) equal to chemical energy
(C) zero, matching the initial momentum
(D) infinite

Correct Answer: C

Explanation: Initial p = 0, so the vector sum of fragment momenta remains zero.

52. Recoil of a gun when a bullet is fired is an example of:

(A) energy creation from nothing
(B) constant velocity of the gun always
(C) zero mass of the bullet
(D) momentum conservation

Correct Answer: D

Explanation: Forward momentum of the bullet is balanced by backward momentum of the gun.

53. A 20 g bullet at 100 m/s leaves a 5 kg gun. Recoil speed of the gun is about:

(A) 0.4 m/s backward
(B) 100 m/s backward
(C) 5 m/s forward
(D) 0

Correct Answer: A

Explanation: $m_b v_b + m_g v_g = 0$ so $v_g = -(0.020)(100)/5 = -0.40$ m/s.

54. A collision is elastic if:

(A) only momentum is conserved
(B) momentum and kinetic energy are both conserved
(C) the bodies stick
(D) KE always increases

Correct Answer: B

Explanation: Elastic means no net loss of mechanical kinetic energy as well as conserved momentum.

55. In an inelastic collision:

(A) momentum is not conserved
(B) both p and KE are lost completely

(C) momentum is conserved but kinetic energy is not
(D) mass is not conserved

Correct Answer: C

Explanation: Some KE becomes heat, sound, or deformation; total p is still conserved if isolated.

56. A meteorite striking Earth is typically:

(A) perfectly elastic
(B) a case of zero momentum
(C) free of energy change
(D) inelastic

Correct Answer: D

Explanation: Deformation and heat mean KE is not conserved.

57. Collisions of many atomic particles can be treated as:

(A) approximately elastic
(B) inelastic always
(C) without momentum
(D) 2-D rotation only

Correct Answer: A

Explanation: At that scale, objects often rebound with little internal energy loss.

58. If two equal-mass bodies collide elastically in 1-D, they:

(A) stop
(B) exchange velocities
(C) stick
(D) reverse both speeds to zero

Correct Answer: B

Explanation: If two equal-mass bodies collide elastically in 1-D, they exchange velocities.

59. A body hits an identical body at rest elastically in 1-D. After impact the first body:

(A) continues at u1
(B) rebounds at −u1
(C) stops, and the second moves at u1
(D) both move at u1/2

Correct Answer: C

Explanation: A body hits an identical body at rest elastically in 1-D. After impact the first body stops, and the second moves at u1.

60. A light ball hitting a very massive wall elastically:

(A) stops
(B) goes through the wall
(C) makes the wall move at 2u
(D) rebounds with nearly the same speed

Correct Answer: D

Explanation: A light ball hitting a very massive wall elastically rebounds with nearly the same speed.

61. A very heavy body hitting a light body at rest elastically approximately:

(A) keeps speed u1 while the light body goes near 2u1
(B) stops
(C) both reverse
(D) both stop

Correct Answer: A

Explanation: The massive object is almost unaffected; the light one is knocked forward at about twice u1.

62. When two carts couple and roll together, the collision is:

(A) elastic

(B) perfectly inelastic
(C) an explosion
(D) free fall

Correct Answer: B

Explanation: They share one velocity afterwards; KE is not conserved.

63. Two equal-mass carts at +2 m/s and −1 m/s stick together. Combined speed is:

(A) 3 m/s
(B) 1 m/s
(C) 0.5 m/s
(D) 0

Correct Answer: C

Explanation: m(2) + m(−1) = 2m v so v = 0.5 m/s in the original faster direction.

64. Relative speed of approach equals relative speed of separation in:

(A) all inelastic collisions
(B) explosions only
(C) free fall only
(D) 1-D elastic collisions

Correct Answer: D

Explanation: That speed relation is a marker of elastic 1-D impact (no restitution coefficient needed here).

65. Rocket motion in a straight line (constant mass approximation in the book) uses:

(A) momentum change as exhaust is thrown backward
(B) conservation of charge
(C) zero thrust always
(D) g only

Correct Answer: A

Explanation: Rocket motion in a straight line (constant mass approximation in the book) uses momentum change as exhaust is thrown backward.

66. A karate chop that breaks a brick relies on a large:

(A) time of contact
(B) impulse in a short time, hence a large force
(C) constant slow push
(D) zero momentum

Correct Answer: B

Explanation: Impulse = change of momentum = F Delta t; a short Delta t means a large F.

67. Impulse equals:

(A) m / v
(B) only energy
(C) F Delta t, also Delta p
(D) g t^2

Correct Answer: C

Explanation: A force acting for a time changes momentum by that impulse.

68. If launch speed is doubled (same angle, no air), range becomes:

(A) the same
(B) twice
(C) half
(D) four times

Correct Answer: D

Explanation: If launch speed is doubled (same angle, no air), range becomes four times.

69. If launch speed is doubled (same angle, no air), maximum height becomes:

(A) four times
(B) the same
(C) twice
(D) half

Correct Answer: A

Explanation: If launch speed is doubled (same angle, no air), maximum height becomes four times.

70. A projectile launched vertically (theta = 90 degrees) has range:

(A) maximum
(B) zero on level ground
(C) equal to H
(D) infinite

Correct Answer: B

Explanation: There is no horizontal velocity, so it lands at the launch point.

71. A projectile launched horizontally has theta =:

(A) 90 degrees
(B) 45 degrees
(C) 0 degrees
(D) 180 degrees

Correct Answer: C

Explanation: A projectile launched horizontally has theta = 0 degrees.

72. The vertical component of a projectile's velocity is smallest at:

(A) launch
(B) halfway up
(C) landing, always
(D) the top

Correct Answer: D

Explanation: The vertical component of a projectile's velocity is smallest at the top.

73. For motion equations, taking the direction of vi as positive means:

(A) quantities opposite to vi are negative
(B) downward is always positive
(C) all vectors become scalars without sign
(D) g is never negative

Correct Answer: A

Explanation: A consistent sign convention is required for 1-D problems.

74. If a car goes from 5 m/s to 15 m/s over 50 m, acceleration from 2aS = vf^2 − vi^2 is:

(A) 4 m/s^2
(B) 2 m/s^2
(C) 1 m/s^2
(D) 10 m/s^2

Correct Answer: B

Explanation: 2a(50) = 225 − 25 = 200, so a = 2 m/s^2.

75. Time for that 50 m trip with a = 2 m/s^2 and vi = 5 m/s is:

(A) 2 s
(B) 10 s
(C) 5 s
(D) 1 s

Correct Answer: C

Explanation: Time for that 50 m trip with a = 2 m/s^2 and vi = 5 m/s is 5 s.

76. A kangaroo that reaches 2.50 m with vf = 0 at the top needs takeoff speed from 2gh = vf^2 − vi^2 of about:

(A) 2.5 m/s
(B) 9.8 m/s
(C) 0
(D) 7 m/s

Correct Answer: D

Explanation: vi^2 = 2gh = 2(9.8)(2.50) so vi is about 7 m/s.

77. Total time in air for a jump that goes up and down the same height is:

(A) twice the time to the top
(B) time to top only
(C) independent of g
(D) zero

Correct Answer: A

Explanation: Up and down take equal times if air is neglected.

78. In 2-D, collision analysis still uses:

(A) only energy always
(B) conservation of each momentum component if no external impulse in that direction
(C) only mass addition
(D) g as a horizontal force

Correct Answer: B

Explanation: px and py are conserved separately in an isolated plane collision.

79. The path of a projectile without air is a:

(A) circle
(B) straight vertical line always
(C) parabola
(D) helix

Correct Answer: C

Explanation: The path of a projectile without air is a parabola.

80. If |A cross B| style thinking is not needed here: range formula uses sin 2theta because:

(A) sin theta = 2 theta
(B) g = 2 theta
(C) vi = 2 theta
(D) 2 sin theta cos theta = sin 2theta

Correct Answer: D

Explanation: If |A cross B| style thinking is not needed here: range formula uses sin 2theta because 2 sin theta cos theta = sin 2theta.

B. Less Important / Secondary Topics

81. Which is not a type of mechanical motion listed with translation?

(A) photosynthesis
(B) rotation
(C) vibration
(D) translation

Correct Answer: A

Explanation: Photosynthesis is a chemical process, not a type of mechanical motion.

82. Average velocity is displacement divided by:

(A) mass
(B) time

(C) force
(D) acceleration

Correct Answer: B

Explanation: Velocity is rate of change of displacement.

83. If acceleration is zero, vf equals:

(A) at
(B) 2 vi
(C) vi
(D) g

Correct Answer: C

Explanation: If acceleration is zero, vf equals vi.

84. S = (vi + vf)t / 2 is useful because it is:

(A) Newton's third law
(B) the definition of mass
(C) only for circular motion
(D) the area of a trapezium on the v-t graph

Correct Answer: D

Explanation: Average of parallel sides times time is the trapezium area.

85. g is directed:

(A) toward Earth's centre
(B) away from Earth
(C) horizontally east
(D) randomly

Correct Answer: A

Explanation: g is directed toward Earth's centre.

86. Air resistance on a projectile acts:

(A) to increase both speed components
(B) like a friction that reduces speed
(C) only on massless objects
(D) as a nuclear force

Correct Answer: B

Explanation: Air resistance on a projectile acts like a friction that reduces speed.

87. Complementary angles for the same range include:

(A) 45 degrees and 90 degrees
(B) 0 and 30
(C) 15 degrees and 75 degrees
(D) 60 and 60

Correct Answer: C

Explanation: Complementary angles for the same range include 15 degrees and 75 degrees.

88. Rmax occurs at 45 degrees only for:

(A) any hillside
(B) motion in water
(C) circular orbits
(D) level ground and no air, given vi

Correct Answer: D

Explanation: Rmax occurs at 45 degrees only for level ground and no air, given vi.

89. A closed (isolated) system means:

(A) net external force is taken as zero
(B) temperature is 0 K

(C) volume is infinite
(D) charge is created

Correct Answer: A

Explanation: A closed (isolated) system means net external force is taken as zero.

90. KE is (1/2)mv^2; in an inelastic crash some KE becomes:

(A) extra rest mass of Earth
(B) heat and deformation
(C) new charge
(D) g

Correct Answer: B

Explanation: Sound, heat, and shape change account for the missing KE.

91. Ball-and-bat impact is a brief:

(A) steady gravitational orbit
(B) nuclear decay
(C) collision transferring momentum
(D) static equilibrium only

Correct Answer: C

Explanation: Ball-and-bat impact is a brief collision transferring momentum.

92. Car crash analysis often treats the crash as:

(A) elastic always
(B) zero force
(C) free fall from orbit
(D) inelastic, with momentum still conserved if the pair is isolated

Correct Answer: D

Explanation: Vehicles crumple; KE is not conserved, p still is for the isolated pair.

93. If m1 = 5 kg, u1 = 10 m/s and m2 = 10 kg, u2 = 5 m/s (same direction) elastically, v1 is about:

(A) 3.3 m/s
(B) 10 m/s
(C) 0
(D) 15 m/s

Correct Answer: A

Explanation: If m1 = 5 kg, u1 = 10 m/s and m2 = 10 kg, u2 = 5 m/s (same direction) elastically, v1 is about 3.3 m/s.

94. A 0.5 kg ball at 4 m/s hits 3.5 kg at rest elastically. The light ball's velocity is about:

(A) +4 m/s
(B) −3 m/s
(C) 0
(D) +1 m/s

Correct Answer: B

Explanation: A 0.5 kg ball at 4 m/s hits 3.5 kg at rest elastically. The light ball's velocity is about −3 m/s.

95. Position at time t of a projectile needs:

(A) only speed
(B) only mass
(C) both x(t) and y(t)
(D) only range formula

Correct Answer: C

Explanation: Location is the pair of coordinates at that instant.

96. Launch angle for maximum range on level ground is not 90 degrees because:

(A) g becomes zero
(B) mass doubles

(C) time of flight is zero
(D) then there is no horizontal motion

Correct Answer: D

Explanation: A vertical shot returns to the origin; range is zero.

97. viy for a horizontal launch is zero, so vy after time t is:

(A) g t (down)
(B) vi
(C) 0 always
(D) vi cos theta

Correct Answer: A

Explanation: It gains downward speed g t from rest vertically.

98. The magnitude of launch velocity from a cliff of height h landing at distance x (horizontal launch) uses:

(A) R = vi^2/g at 45 degrees
(B) t from h = (1/2)gt^2 then vx = x/t
(C) p = mv only
(D) F = ma with F = 0

Correct Answer: B

Explanation: Find fall time first, then divide range by that time.

99. If two fragments after an explosion have momenta 3 kg m/s left and 3 kg m/s right (2-piece, rest initially), total p is:

(A) 6 kg m/s
(B) 9
(C) 0
(D) undefined

Correct Answer: C

Explanation: If two fragments after an explosion have momenta 3 kg m/s left and 3 kg m/s right (2-piece, rest initially), total p is 0.

100. A 3 kg piece at 1.6 m/s and a 6 kg piece from a 9 kg bomb at rest: the 6 kg speed is:

(A) 1.6 m/s
(B) 3.2 m/s
(C) 0
(D) 0.8 m/s

Correct Answer: D

Explanation: 3(1.6) = 6 v so v = 0.8 m/s opposite; KE of 6 kg is 1.92 J.

101. Force on a projectile after launch (no air) is:

(A) gravitational force
(B) the continuing launch force
(C) nuclear force
(D) magnetic force of Earth as the main one in the unit

Correct Answer: A

Explanation: Force on a projectile after launch (no air) is gravitational force.

102. Uniform acceleration graphically is a v-t graph that is:

(A) a curve with changing slope
(B) a straight line
(C) a horizontal line at v = 0 only
(D) a circle

Correct Answer: B

Explanation: Uniform acceleration graphically is a v-t graph that is a straight line.

103. If vi and a are in opposite directions, the body:

(A) speeds up
(B) has g = 0
(C) slows down (until stop)
(D) cannot be treated with the equations

Correct Answer: C

Explanation: If vi and a are in opposite directions, the body slows down (until stop).

104. Worked distance S during acceleration is not equal to vf t because:

(A) mass changed
(B) g reversed
(C) time is infinite
(D) speed was not constant at vf the whole time

Correct Answer: D

Explanation: You must use average speed or the second.

105. Independence of axes lets you treat projectile x-motion as:

(A) uniform velocity
(B) free fall with g
(C) uniform circular motion
(D) SHM

Correct Answer: A

Explanation: Independence of axes lets you treat projectile x-motion as uniform velocity.

106. Independence of axes lets you treat projectile y-motion as:

(A) uniform velocity always
(B) 1-D motion with a = ±g
(C) no acceleration
(D) constant vy

Correct Answer: B

Explanation: Vertical motion is the same as a vertical throw or drop.

107. If air resistance increases time of flight slightly while cutting range, vx must have:

(A) increased
(B) become g
(C) decreased on average
(D) become infinite

Correct Answer: C

Explanation: A smaller average horizontal speed means less range even if hang time grows a bit.

108. Conservation of momentum applies to a system if we:

(A) ignore mass
(B) set g = 0 always
(C) use only scalars
(D) include all interacting parts so external impulse is negligible

Correct Answer: D

Explanation: Choose the system so internal forces cancel and external impulses can be neglected.