Module – 2

VOCABULARY AND TOOLS

Syllabus:

Vocabulary and Tools: Attitude and speed, Newton's second law/Newton's law, Concept of Energy and Total path flight angle.

MCQs

1. Which term refers to the rate at which an object changes its position?

a) Attitude

b) Speed

c) Newton's second law

d) Energy

2. The SI unit of speed is:

a) Kilometer per hour

b) Meter per second

c) Centimeter per second

d) Miles per hour

3. Attitude is a term used to describe:

a) The object's position relative to a reference point

b) The object's resistance to change in motion

c) The object's path of motion

4. What is the formula to calculate speed?

a) Speed = Distance × Time

b) Speed = Time ÷ Distance

c) Speed = Distance + Time

d) Speed = Time − Distance

5. According to Newton's second law, the force acting on an object is directly proportional to its:

a) Acceleration

b) Mass

c) Velocity

d) Displacement

6. The SI unit of force is:

a) Newton

b) Kilogram

c) Meter

d) Second

7. Which of the following equations represents Newton's second law?

a) F = ma

b) F = mv

c) F = ms

d) F = md

8. If the mass of an object is doubled while the force acting on it remains the same, the acceleration will:

a) Double

b) Halve

c) Remain the same

d) Be quadrupled

9. Energy can be defined as the ability to:

a) Move fast

b) Cause changes in matter

c) Exert force

d) Generate electricity

10. Which of the following is not a form of energy?

a) Kinetic energy

b) Potential energy

c) Thermal energy

d) Magnetic energy

11. The total path flight angle refers to:

a) The angle of elevation of an object's flight path

b) The angle of depression of an object's flight path

c) The sum of the angle of elevation and angle of depression

d) The angle between an object's initial and final positions

12. In projectile motion, the total path flight angle is measured relative to the:

a) Horizontal axis

b) Vertical axis

c) Resultant force

d) Initial velocity vector

13. The total path flight angle of a projectile affects its:

a) Maximum height reached

b) Range of motion

c) Time of flight

d) All of the above

14. What is the range of possible values for the total path flight angle in projectile motion?

a) 0° to 90°

b) 0° to 180°

c) 0° to 360°

d) -90° to 90°

15. At what total path flight angle will a projectile achieve maximum range?

a) 0°

b) 45°

c) 90°

d) 180°

16. If the total path flight angle of a projectile is 90°, what can be said about its range?

a) The range will be zero.

b) The range will be maximum.

c) The range will be infinite.

d) The range cannot be determined.

17. The total path flight angle is the sum of:

a) Launch angle and impact angle

b) Launch angle and initial velocity angle

c) Launch angle and final velocity angle

d) Impact angle and final velocity angle

18. In projectile motion, if the total path flight angle is 0°, the object will:

a) Not move horizontally

b) Not move vertically

c) Not move at all

d) Move with maximum velocity

19. What is the total path flight angle of a projectile when it is launched vertically upwards?

a) 0°

b) 45°

c) 90°

d) 180°

20. How does the total path flight angle affect the time of flight of a projectile?

a) It has no effect on the time of flight.

b) The time of flight increases with a larger total path flight angle.

c) The time of flight decreases with a larger total path flight angle.

d) The time of flight is independent of the total path flight angle.

21. Which of the following is a scalar quantity?

a) Velocity

b) Acceleration

c) Speed

d) Displacement

22. The concept of energy is closely related to which fundamental law of physics?

a) Newton's First Law

b) Newton's Second Law

c) Newton's Third Law

d) Law of Conservation of Energy

23. Which form of energy is associated with the motion of an object?

a) Potential energy

b) Kinetic energy

c) Thermal energy

d) Chemical energy

24. What is the SI unit of energy?

a) Joule

b) Watt

c) Newton

d) Pascal

25. The concept of potential energy arises from an object's:

a) Mass

b) Velocity

c) Height or position

d) Temperature

26. The law of conservation of energy states that energy cannot be:

a) Created

b) Destroyed

c) Transformed

d) Transferred

27. Which of the following is an example of potential energy?

a) A moving car

b) A burning candle

c) A stretched spring

d) A spinning top

28. The total mechanical energy of an object is the sum of its:

a) Kinetic energy and potential energy

b) Speed and acceleration

c) Force and displacement

d) Mass and velocity

29. What is the unit of power?

a) Watt

b) Joule

c) Newton

d) Pascal

30. The rate at which work is done or energy is transferred is known as:

a) Power

b) Force

c) Velocity

d) Acceleration

31. Which of the following equations represents power?

a) Power = Force × Velocity

b) Power = Force ÷ Velocity

c) Power = Work ÷ Time

d) Power = Time ÷ Work

32. In a situation where an object is at rest or moving at a constant velocity, the net force acting on it must be:

a) Zero

b) Positive

c) Negative

d) Changing

33. Which of Newton's laws of motion states that for every action, there is an equal and opposite reaction?

a) Newton's First Law

b) Newton's Second Law

c) Newton's Third Law

d) Newton's Law of Universal Gravitation

34. A person pushes a box with a force of 20 N to the right, and the box accelerates to the right. What can you conclude about the force of friction acting on the box?

a) The force of friction is greater than 20 N.

b) The force of friction is less than 20 N.

c) The force of friction is exactly 20 N.

d) The force of friction is zero.

35. Which of the following statements accurately describes an object in equilibrium?

a) The object is at rest.

b) The object is moving with a constant velocity.

c) The net force acting on the object is zero.

d) All of the above.

36. If a force of 10 N is applied to an object with a mass of 2 kg, what is the resulting acceleration of the object?

a) 2 m/s^2

b) 5 m/s^2

c) 10 m/s^2

d) 20 m/s^2

37. In which scenario is work being done on an object?

a) Lifting a book from the floor to a table.

b) Holding a book stationary in your hand.

c) Pushing a wall with all your strength.

d) All of the above.

38. Which of the following quantities is a vector quantity?

a) Mass

b) Speed

c) Distance

d) Displacement

39. The unit of force is derived from which law of motion?

a) Newton's First Law

b) Newton's Second Law

c) Newton's Third Law

d) Law of Universal Gravitation

40. A car travels with a constant speed of 60 km/h for 2 hours. What is the total distance traveled by the car?

a) 30 km

b) 60 km

c) 120 km

d) 240 km

41. Which of the following best describes the concept of terminal velocity?

a) The maximum velocity an object can reach while falling through a fluid.

b) The initial velocity of an object dropped from rest.

c) The velocity of an object at the highest point of its trajectory.

d) The velocity of an object just before it hits the ground.

42. What is the relationship between the mass of an object and its inertia?

a) They are directly proportional.

b) They are inversely proportional.

c) They have no relationship.

d) The relationship depends on the object's speed.

43. The law of conservation of momentum states that the total momentum of a closed system:

a) Increases over time.

b) Decreases over time.

c) Remains constant over time.

d) Depends on the force applied.

44. Which of the following statements is true about elastic collisions?

a) Kinetic energy is conserved.

b) Kinetic energy is not conserved.

c) Momentum is conserved.

d) Both momentum and kinetic energy are conserved.

45. The law of universal gravitation describes the gravitational force between two objects based on their:

a) Speed

b) Mass

c) Volume

d) Temperature

46. What is the value of the acceleration due to gravity near the surface of the Earth?

a) 9.8 m/s^2

b) 6.7 m/s^2

c) 3.0×10^8 m/s^2

d) 0.2 m/s^2

47. The gravitational force between two objects is inversely proportional to the:

a) Mass of one object

b) Distance between the objects

c) Speed of one object

d) Time elapsed

48. The weight of an object is:

a) The force exerted by the object on a surface.

b) The force exerted by a surface on the object.

c) The mass of the object multiplied by the acceleration due to gravity.

d) The mass of the object divided by the acceleration due to gravity.

49. Which of the following is a unit of pressure?

a) Pascal

b) Joule

c) Newton

d) Kilogram

50. The pressure exerted by a fluid depends on:

a) The depth of the fluid

b) The density of the fluid

c) The acceleration due to gravity

d) All of the above

51. Archimedes' principle states that the buoyant force on an object submerged in a fluid is equal to:

a) The weight of the object

b) The volume of the object

c) The mass of the object

d) The density of the fluid

52. The concept of work is defined as:

a) The movement of an object in a circular path

b) The exertion of a force on an object to cause displacement

c) The transfer of heat energy between objects

d) The rate at which an object moves

53. The unit of work is derived from which fundamental physical quantity?

a) Force

b) Velocity

c) Acceleration

d) Energy

54. Which of the following scenarios represents an example of work being done?

a) Holding a heavy object in your hand without moving it

b) Pushing against a wall that doesn't move

c) Lifting a book from the floor to a table

d) Sitting at a desk and reading a book

55. Which of the following equations represents the calculation of work done?

a) Work = Force × Time

b) Work = Force ÷ Distance

c) Work = Force × Distance

d) Work = Time ÷ Distance

56. If a force is applied to an object but the object doesn't move, the work done is:

a) Zero

b) Positive

c) Negative

d) Cannot be determined

57. In the context of work, what does it mean when the angle between the force and displacement is 0°?

a) The force and displacement are perpendicular to each other.

b) The force and displacement are parallel to each other.

c) The force and displacement are at a right angle to each other.

d) The force and displacement are at a 45° angle to each other.

58. Which of the following is a form of renewable energy?

a) Coal

b) Natural gas

c) Solar power

d) Oil

59. What is the formula to calculate gravitational potential energy?

a) Potential Energy = Mass × Acceleration

b) Potential Energy = Mass × Velocity

c) Potential Energy = Mass × Height × Acceleration

d) Potential Energy = Mass × Height × Gravity

60. The law of conservation of energy states that:

a) Energy can be created but not destroyed.

b) Energy can be destroyed but not created.

c) Energy can be transformed from one form to another.

d) Energy cannot be created or destroyed, only transferred or transformed.

61. What type of energy transformation occurs in a light bulb?

a) Electrical energy to thermal energy

b) Thermal energy to electrical energy

c) Mechanical energy to electrical energy

d) Electrical energy to light energy

62. Which of the following statements is true about the law of conservation of energy?

a) The total energy in a system always decreases.

b) The total energy in a system always increases.

c) The total energy in a system remains constant.

d) The total energy in a system fluctuates randomly.

63. What is the unit of electric power?

a) Watt

b) Joule

c) Newton

d) Volt

64. The rate at which work is done or energy is transferred is known as:

a) Power

b) Force

c) Velocity

d) Acceleration

65. Which of the following equations represents power?

a) Power = Force × Velocity

b) Power = Force ÷ Velocity

c) Power = Work ÷ Time

d) Power = Time ÷ Work

66. Which of the following scenarios represents an example of potential energy being converted into kinetic energy?

a) A car accelerating from rest

b) A ball rolling down a hill

c) A person climbing a ladder

d) A person sitting on a chair

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68. The law of conservation of momentum states that the total momentum of a closed system:

a) Increases over time

b) Decreases over time

c) Remains constant over time

d) Depends on the force applied

69. In an isolated system, if one object gains momentum, another object in the system must:

a) Gain momentum as well

b) Lose momentum

c) Not be affected

d) Have a change in velocity

70. Which of the following best describes an inelastic collision?

a) Momentum is conserved, but kinetic energy is not conserved.

b) Kinetic energy is conserved, but momentum is not conserved.

c) Both kinetic energy and momentum are conserved.

d) Neither kinetic energy nor momentum is conserved.

71. The concept of torque is related to which physical quantity?

a) Force

b) Velocity

c) Power

d) Pressure

72. Which of the following factors affects the torque produced by a force?

a) The magnitude of the force

b) The distance from the axis of rotation

c) The angle between the force and the lever arm

d) All of the above

73. What is the unit of torque?

a) Newton

b) Pascal

c) Joule

d) Newton-meter

74. The concept of angular momentum is related to the rotational analog of which physical quantity?

a) Mass

b) Velocity

c) Acceleration

d) Energy

75. Which of the following statements is true about angular momentum in a closed system?

a) Angular momentum is conserved.

b) Angular momentum increases with time.

c) Angular momentum decreases with time.

d) Angular momentum depends on the axis of rotation.

76. What is the relationship between the radius and the period of an object undergoing uniform circular motion?

a) Directly proportional

b) Inversely proportional

c) No relationship

d) Depends on the mass of the object

77. The centripetal force acting on an object moving in a circle is directed:

a) Away from the center of the circle

b) Toward the center of the circle

c) Tangential to the circle

d) Perpendicular to the plane of the circle

78. The centrifugal force is a:

a) Real force acting outward on a rotating object

b) Fictitious force acting outward on a rotating object

c) Force that maintains circular motion

d) Force that opposes circular motion

79. The total path flight angle of a projectile can be determined by:

a) The initial velocity and time of flight

b) The launch angle and range of motion

c) The vertical and horizontal components of velocity

d) The mass and acceleration of the projectile

80. The total path flight angle of a projectile is measured:

a) Relative to the horizontal axis

b) Relative to the vertical axis

c) Relative to the ground

d) Relative to the launch angle

81. In projectile motion, what happens when the total path flight angle is 90°?

a) The projectile will not have any horizontal motion.

b) The projectile will not have any vertical motion.

c) The projectile will reach its maximum height.

d) The projectile will have maximum range.

82. The total path flight angle is the sum of:

a) Launch angle and impact angle

b) Launch angle and initial velocity angle

c) Launch angle and final velocity angle

d) Impact angle and final velocity angle

83. In projectile motion, if the total path flight angle is 0°, the object will:

a) Not move horizontally

b) Not move vertically

c) Not move at all

d) Move with maximum velocity

84. What is the total path flight angle of a projectile when it is launched vertically upwards?

a) 0°

b) 45°

c) 90°

d) 180°

85. How does the total path flight angle affect the time of flight of a projectile?

a) It has no effect on the time of flight.

b) The time of flight increases with a larger total path flight angle.

c) The time of flight decreases with a larger total path flight angle.

d) The time of flight is independent of the total path flight angle.

86. The total path flight angle determines the:

a) Maximum height reached by the projectile

b) Range of the projectile

c) Trajectory of the projectile

d) All of the above

87. What is the range of possible values for the total path flight angle in projectile motion?

a) 0° to 90°

b) 0° to 180°

c) 0° to 360°

d) -90° to 90°

88. At what total path flight angle will a projectile achieve maximum range?

a) 0°

b) 45°

c) 90°

d) 180°

89. If the total path flight angle of a projectile is 180°, what can be said about its range?

a) The range will be zero.

b) The range will be maximum.

c) The range will be infinite.

d) The range cannot be determined.

90. In projectile motion, the total path flight angle is measured relative to:

a) The horizontal axis

b) The vertical axis

c) The launch angle

d) The impact angle

91. The total path flight angle of a projectile affects its:

a) Maximum height reached

b) Range of motion

c) Time of flight

d) All of the above

92. A projectile is launched at an angle of 60° with respect to the horizontal. What is the total path flight angle of the projectile?

a) 30°

b) 45°

c) 60°

d) 90°

93. In projectile motion, which angle determines the maximum height reached by the projectile?

a) Launch angle

b) Impact angle

c) Total path flight angle

d) None of the above

94. What happens to the maximum height reached by a projectile if the total path flight angle is increased?

a) It increases

b) It decreases

c) It remains the same

d) It cannot be determined

95. The total path flight angle of a projectile launched at an angle of 30° will be:

a) 0°

b) 30°

c) 60°

d) 90°

96. In projectile motion, the maximum range is achieved at a total path flight angle of:

a) 0°

b) 45°

c) 90°

d) 180°

97. A projectile is launched with a total path flight angle of 90°. What can you conclude about its range?

a) The range will be zero.

b) The range will be maximum.

c) The range will be infinite.

d) The range cannot be determined.

98. The total path flight angle of a projectile is the sum of the:

a) Launch angle and impact angle

b) Launch angle and initial velocity angle

c) Launch angle and final velocity angle

d) Impact angle and final velocity angle

99. The range of a projectile is determined by its:

a) Initial velocity

b) Launch angle

c) Total path flight angle

d) All of the above

100. What is the total path flight angle of a projectile when it is launched vertically upwards?

a) 0°

b) 45°

c) 90°

d) 180°

101. The concept of power is defined as the:

a) Ability to do work

b) Rate at which work is done or energy is transferred

c) Force exerted on an object

d) Speed at which an object moves

102. A machine that has an efficiency of 80% means that:

a) It can only output 80% of the input power

b) It wastes 20% of the input power

c) It is 80% reliable in its operation

d) It can only perform 80% of the tasks it is designed for