Physical Science Examination
Elementary School Division
IAC Nationals 2023

Name _____

School _____

Grade _____

Instructions – Mark your answers on the scantron provided. Correct answers are worth 2 points. Incorrect answers are worth –1 point. Questions left blank are worth 0 points. Write the answer to your tiebreaker question on the back of your scantron.

1. What are common units used in the USA to measure speed?
   A. Miles per hour
   B. Centimeters squared
   C. Inches per day
   D. Kilograms

2. What is the smallest unit of matter that still has the properties of an element?
   A. Molecule
   B. Atom
   C. Water
   D. Stainless steel

3. What is the order of visible light from largest to smallest wavelength?
   A. Blue, Indigo, Violet, Red, Orange, Green, Yellow
   B. Yellow, Red, Green, Violet, Indigo, Orange, Blue
   C. Red, Orange, Yellow, Green, Blue, Indigo, Violet
   D. Red, Violet, Green, Orange, Indigo, Yellow, Blue

4. The electromagnetic spectrum contains a range of energies. Which type of electromagnetic radiation has the highest amount of energy?
   A. Radio waves
   B. Infrared
   C. Ultraviolet
   D. Gamma

5. Shining light through a prism results in
   A. A brighter light focused to a point
   B. White light separating into a rainbow of colors
   C. White light separating into only long wavelengths
   D. Light only emerges under blacklight exposure

6. The amount of matter (atoms, molecules etc.) making something up is called
   A. Volume
   B. Mass
   C. Area
   D. Circumference

7. When a ball is thrown into the air, it is called a
   A. Projectile
   B. Missile
   C. Directive
   D. Umbra

8.. Adding the primary colors of red, green and blue produce
   A. Yellow light
   B. Pink light
   C. Black light
   D. White light

9.. When a car is moving at the same speed without changing direction, we say it is moving with
   A. Constant velocity
   B. Faster and faster acceleration
   C. Stationary
   D. Floating

10.. What is the difference between speed and velocity?
   A. Velocity measurements include direction
   B. Velocity and Speed have different magnitudes
   C. Speed measurements include direction
   D. There is no difference between the two

11. A wave is a disturbance that travels through matter transferring
   A. Water
   B. People
   C. Energy
   D. Animals

12. Mechanical waves travel through a medium. Which of the following is NOT a medium?
   A. Water
   B. Air
   C. Mountains
   D. Energy

13. Waves in the ocean are mostly generated by
    A. Whales
    B. Wind
    C. Hurricanes
    D. Large boats.

14. Light is a form of
    A. Matter
    B. Mass
    C. Energy
    D. Medium

15. What is able to travel the fastest in the Universe?
    A. Cheetahs
    B. Maserati Sports car
    C. Matter
    D. Light

16. Light travels in a straight line called a
    A. Ray
    B. Arc
    C. Parabola
    D. Wave

17. When light is refracted it
    A. Curves clockwise
    B. Bends
    C. Continues in a straight line
    D. Curves counter-clockwise

18. Sound begins with a
    A. Vibration
    B. Medium
    C. Wind
    D. People

19. Which of the following would be the hardest to stop because it has more momentum?
    A. A toddler running
    B. A big dog running
    C. A truck
    D. A bicycle

20. Which has more mass?
    A. A mouse
    B. A puppy
    C. A sugar cube
    D. A moose

21.The amount of space something takes up is called
    A. Mass
    B. Volume
    C. Matter
    D. Weight

22. Which of the following has the most volume?
    A. A 2-liter bottle of soda
    B. A small coke from McDonalds
    C. A 1-liter bottle of water
    D. A very large weather balloon

23. Energy that moving objects have is
    A. Kinetic energy
    B. Potential energy
    C. Spring energy
    D. Elastic energy

24. Which of the following does NOT have potential energy?
    A. A ball kicked into the air
    B. A rock on the edge of a cliff
    C. A soccer ball on the ground
    D. A yo-yo going up and down

25. Where on a ride does a roller coaster have the most potential energy?
    A. At the top of the first hill
    B. At the bottom of the first hill
    C. In the loop-de-loop
    D. At the end of the ride

26. A push or pull in physics is called
    A. An annoyance
    B. A force
    C. A play
    D. A transfer of energy

27. Which of Newton's Laws of Motion states "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. None of them

28. If a force makes something move a distance then _____ is done
    A. Power
    B. Energy
    C. Potential energy
    D. Work

29. Which has more power?
    A. A person lifting a set weight for a set distance
    B. 1 person lifting twice as much weight but half the distance of the other
    C. 1 person lifting the same weight twice the distance of another
    D. 1 person holding a box while carrying it across the room, while another holds a similar box while standing

30. Work done per unit of time is called
    A. Power
    B. Energy
    C. Wattage
    D. Velocity

31. A measure of a substance's mass per volume is called
    A. Weight
    B. Density
    C. Energy
    D. Joules

32. Particles of matter (atoms, molecules etc.) of a _____ are tightly packed together and have very little movement.
    A. Gas
    B. Liquid
    C. Plasma
    D. Solid

33. Particles of matter (atoms, molecules etc.) of a _____ have high-energy and are not attracted to each other.
    A. Gas
    B. Liquid
    C. Solid
    D. Aluminum

34. Which of the following is a liquid?
    A. Ice
    B. Lemonade
    C. Hail
    D. Plain cereal

35. Three most common states of matter are
    A. Solid, volume, viscosity
    B. Liquid, mass, buoyancy
    C. Solid, liquid, gas
    D. Shape, texture, hardness

36. Which state of matter has particles that can't be compressed (smashed together) and fills whatever container it is in
    A. Gas
    B. Liquid
    C. Solid
    D. Plasma

37. When a substance changes from a solid to a liquid we say it has _____.
    A. Solidified
    B. Vaporized
    C. Melted
    D. Frozen

38. In a roller coaster, which location has the greatest kinetic energy?
    A. At the top of the first hill
    B. At the end of the ride
    C. Being pulled up to the top of the first hill
    D. At the bottom of the first hill

39. An example of a chemical change is
    A. Tearing paper
    B. Breaking glass
    C. Cooking eggs
    D. Cutting grass

40. Which is an example of a physical change?
    A. Bike rusting
    B. Melting ice
    C. Frying French fries
    D. Food rotting

41. What is the fourth state of matter?
    A. Plasma
    B. Liquid
    C. Gas
    D. Solid

42. What is an example of a gas?
    A. Orange juice
    B. Water vapor
    C. Olive oil
    D. Concrete

43. When water is heated and becomes water vapor, the process is called
    A. Evaporation
    B. Freezing
    C. Melting
    D. Condensation

44. A change in ____ refers to a change in form from solid, to liquid or gas.
    A. Substance
    B. Demeanor
    C. State
    D. Composition

45. Matter is anything that has _____ and takes up space.
    A. Volume
    B. 3 states of matter
    C. Low viscosity
    D. Mass

46. Eliot played outside while eating her popsicle. Why was it melting?
    A. It absorbed too much heat
    B. It gave off too much heat
    C. It ran out of energy
    D. It was broken

47. Which is NOT an example of a physical property?
    A. Texture
    B. Mass
    C. Color
    D. Reactivity

48. Water boils at _____ degrees Celsius.
    A. 212
    B. 200
    C. 100
    D. 50

49. Which is an example of an element?
    A. Heat
    B. Aluminum
    C. Mass
    D. Vinegar

50. What happens when heat is removed from water vapor?
    A. It condenses
    B. It evaporates
    C. It sublimes
    D. It doesn't change

51. Which of these are properties of matter that can be measured?
    A. Mass
    B. Volume
    C. Temperature
    D. All of these

52. Plants take in _____.
    A. Helium
    B. Carbon dioxide
    C. Oxygen
    D. Glucose

53. Plants give off
    A. Helium
    B. Carbon dioxide
    C. Oxygen
    D. Glucose

54. What do we call anything that has mass and takes up space?
    A. Matter
    B. Volume
    C. Properties
    D. Liquid

55. For photosynthesis to occur, plants need energy. This energy comes from
    A. Air
    B. Earth's soil
    C. Water
    D. The Sun

56. Which of the following is a product of photosynthesis?
    A. Carbon Dioxide
    B. Glucose
    C. Carbon monoxide
    D. None of the above

57. Which of the following is a description of evaporation?
    A. Liquid changes into a gas
    B. Gas changes into a liquid
    C. Liquid changes into a solid
    D. A solid changes into a liquid

58. When water is heated, what happens to the particles of the water?
    A. The particles slow down and get closer together
    B. The particles move slower and get further apart
    C. The particles move faster and move closer together
    D. The particles move faster and get further apart

59. The physical combination of two or more substances is a
    A. Mixture
    B. Ionic compound
    C. Molecule
    D. Molecular compound

60. A material that allows electricity and heat to flow easily is a(n)
    A. Insulator
    B. Conductor
    C. Circuit
    D. Contractor

61. If you were on the moon, which of the following would change?
    A. Mass
    B. Weight
    C. Weight and Mass
    D. Volume

62. Which of the following describes a pulley?
    A. Two inclined planes
    B. A bar that can be used to lift heavy objects
    C. A lever with a fulcrum
    D. A wheel with a groove for a rope

63. If an object is not moving, it will
    A. Start moving by itself
    B. Not move even when a force is applied
    C. Not move until a force makes it move
    D. Start moving easily

64. Simple machines are designed to
    A. Increase potential energy
    B. Make work easier
    C. Increase kinetic energy
    D. Decrease potential energy

65. An inclined plane
    A. Is a wheel with a groove for a rope
    B. Uses a bar to lift heavy objects
    C. Has a lever arm and fulcrum
    D. Can be a ramp

66. What types of particles are in the nucleus of an atom?
    A. Protons only
    B. Neutrons only
    C. Electrons only
    D. Protons and Neutrons

67. Why does a ball kicked across the grass stop rolling?
    A. Friction
    B. It gets tired
    C. Gravity only
    D. Unknown forces

68. Light that reaches your eyes is mostly
    A. Refracted light
    B. Original source light
    C. Reflected light
    D. Convex light

69. If light does not fall in an area it is called a
    A. Shadow
    B. Vortex
    C. Prism
    D. Laser

70. Waves on the electromagnetic spectrum that you can see are
    A. Ultraviolet
    B. Visible Light
    C. Gamma waves
    D. Infrared

71. Energy that is not being used but is being stored is
    A. Kinetic energy
    B. Positive energy
    C. Neutral energy
    D. Potential energy

72. Light travels in a _____ line.
    A. Curvy
    B. Shape like an oval
    C. Straight
    D. Perimeter of a square

73. Which of the following can't sound travel through?
    A. Air
    B. Empty space
    C. Water
    D. A solid

74. All of the following are simple machines except _____.
    A. Fulcrum
    B. Pulley
    C. Screw
    D. Inclined plane

75. The pull of gravity by a planet measures an object's
    A. Buoyancy
    B. Density
    C. Mass
    D. Weight

Tiebreaker

This question will only be scored if there is a tie for placement on the exam. There is no penalty for a wrong answer to this question. Write your answer legibly on the back of your scantron.

Electron orbitals fill in what order of increasing energy? List them in terms of energy level and orbital.