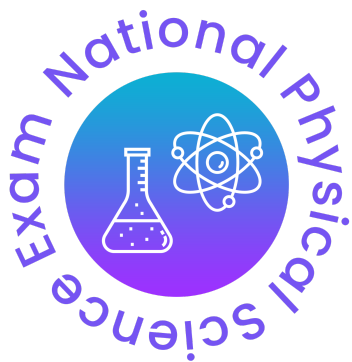




National Championship Physical Science Exam

Name _____

School _____

Grade _____

Email address _____

Instructions - Circle the correct answer or leave it blank. Correct answers are worth 2 points. Incorrect answers are worth -1 point. Questions left blank are worth 0 points.

- Molecules can be described as?
 - mixtures of two or more pure substances.
 - mixtures of two or more elements that have a specific ratio between components.
 - two or more atoms chemically joined together.
 - homogeneous mixtures.
- In the periodic table, what is a period?
 - A horizontal row
 - A vertical line
 - The left hand side
 - The middle block
- Which of the following is the symbol for copper?
 - C
 - Ca
 - Co
 - Cu
- Which of the following is the name for group 7 in the periodic table?
 - Alkali metals
 - Alkaline earth metals
 - Halogens
 - Noble gasses
- Which of the following is the name for group 2 in the periodic table?
 - Alkali metals
 - Alkaline earth metals
 - Halogens
 - Noble gasses
- Which of the following elements is metal?
 - Magnesium
 - Nitrogen
 - Helium
 - Phosphorus
- Predict the charge that an aluminum ion would have.
 - 1+
 - 1-
 - 2+
 - 3+
- What is listed in the Periodic Table?
 - Compounds
 - Elements
 - Gasses
 - Metals
- How many atoms are there in KMnO_4 ?
 - three
 - five
 - six
 - four
- What is the correct formula for H-H?
 - 2H
 - H_1H_1
 - H_2
 - H_{22}
- Which elements are in CoCO_3 ?
 - Cobalt, carbon, and oxygen
 - Cobalt and copper
 - Copper, carbon, and oxygen
 - Copper, chlorine, and oxygen
- Which of the following contains BOTH ionic and covalent bonds?
 - BaF_2
 - Cl_2
 - MgSO_4
 - SF_6
- Which of the following is the correct chemical formula for a molecule of chlorine?
 - Cl
 - Cl^-
 - Cl^+
 - Cl_2

14. Write the name for $\text{Mg}_3(\text{PO}_4)_2$.
- magnesium(III) phosphite
 - magnesium(II) phosphite
 - magnesium phosphate
 - trimagnesium phosphorustetraoxide
15. Which elements are liquids at room temperature?
- Calcium and rubidium
 - Mercury and bromine
 - Mercury and radon
 - Nitrogen and bromine
16. Which of the following elements are magnetic?
- Cobalt, iron, copper
 - Zinc, neodymium, and nickel
 - Iron, nickel, and cobalt
 - Platinum, titanium, and iron
17. The smallest part of an element that retains the identity (and the chemical properties) of that element is?
- A molecule
 - An atom
 - A chemical
 - An electron
18. Which of the following is NOT a helpful chemical?
- Sodium chloride
 - Mercury
 - Penicillin
 - Vinegar
19. Which element gives pepto bismol its pink color?
- Potassium
 - Barium
 - Selenium
 - Bismuth
20. For a scientific theory to be valid, it must allow you to?
- Perform experiments
 - Obtain new results each time
 - Find a new, more complex explanation
 - Make predictions
21. What element is used to galvanize steel?
- Nickel
 - Magnesium
 - Zinc
 - Cobalt
22. What chemical gets into drinking water through pipes?
- Arsenic
 - Chlorine
 - Flourine
 - Lead
23. Which of the following solutions will have the highest concentration of fluoride ions?
- 0.10 M KF
 - 0.10 M SrF_2
 - 0.10 M AlF_3
 - 0.05 M CaF_2
24. Which of the following explains the difference between speed and velocity?
- Velocity has motion, and speed does not
 - Velocity has direction, and speed does not
 - Velocity involves time, and speed does not
 - Velocity involves acceleration, and speed does not
25. What are the main branches of natural science?
- Physics and chemistry
 - Biology, zoology, & ecology
 - Medicine & agriculture
 - Life, physical, & earth science
26. Pure science is best defined as the?
- Continuing search for new knowledge
 - Use of science to solve human problems
 - Study of the makeup of living things
 - Application of scientific knowledge
27. What do scientists who do pure science do?
- They look for ways to use scientific knowledge to solve problems
 - They develop new uses for scientific knowledge
 - They do experiments to find out about the world
 - They build faster and more powerful computers
28. What is a scientific law?
- It is the same as a hypothesis
 - It is a description of a natural event
 - It is an explanation of scientific observation
 - It is the conclusion of a scientific experiment

29. A scientific model is a?
- Representation of a real event or object
 - Small building used to conduct experiments
 - Mathematical statement of a theory
 - New theory that takes the place of an incorrect one
30. A series of logical steps that is followed in order to solve a problem is called the?
- Experimental process
 - Scientific theory
 - Scientific method
 - Model method
31. Which question cannot be answered by an experiment?
- Does penicillin kill Salmonella bacteria?
 - Is rabies caused by a virus?
 - Did a comet impact kill the dinosaurs?
 - Can radiation cause cancer?
32. What is the SI unit for measuring temperature?
- Degree
 - Kelvin
 - Mole
 - Ampere
33. Which SI prefix means one million??
- Kilo-
 - Mega-
 - Giga-
 - Milli-
34. Maria is 123 centimeters tall. Her height in meters is?
- 0123 m
 - 0.123 m
 - 1.23 m
 - 12.3 m
35. The force with which gravity pulls on a quantity of matter is referred to as?
- Mass
 - Length
 - Volume
 - Weight
36. Which of the following processes is exothermic?
- a candle flame
 - melting of ice
 - the chemical reaction in a "cold pack" often used to treat injuries
 - the vaporization of water
37. A precise measurement is one that
- Contains the correct number of significant figures
 - Contains at least three significant figures
 - Is close to the true value
 - Is as exact as possible
38. What is 78,900,000,000 expressed in scientific notation?
- 789×109
 - 7.89×10^{10}
 - 7.89×10^9
 - 7.89×10^{11}
39. A measurement that is accurate is one that
- Is as exact as possible
 - Is close to the true value
 - Contains at least four significant figures
 - Contains five decimal places
40. A substance that cannot be broken down into simpler substances is?
- a compound
 - an element
 - a mixture
 - an atom
41. Identify the substances which contain a high concentration of a specific mineral.
- slag
 - minerals
 - ores
 - gangue
42. Matter is defined as anything that
- can be seen and touched
 - can be weighed
 - has mass and takes up space
 - contains kinetic or potential energy
43. You put 1 gram of salt into 1 liter of water and stir. The resulting liquid is an example of?
- A pure substance
 - A heterogeneous mixture
 - A homogeneous mixture
 - An immiscible mixture
44. Galvanizing is when an object is dipped into a molten bath of
- magnesium.
 - lithium.
 - zinc.
 - sodium.

45. Identify a nonmetal.
- P
 - Ca
 - Pd
 - Ni
46. The science of what matter is made of and how it changes is called?
- Chemistry
 - Physics
 - Kinetics
 - Engineering
47. The chemical element that is most abundant in the human body is?
- Nitrogen
 - Iron
 - Carbon
 - Oxygen
48. Identify baking powder.
- lithium bicarbonate
 - sodium bicarbonate and an acid
 - magnesium carbonate and a base
 - magnesium oxide
49. The chemical symbol for sulfuric acid is H_2SO_4 . How many atoms are contained in each molecule of sulfuric acid?
- 3
 - 5
 - 6
 - 7
50. The element that is most abundant on Earth is?
- Iron
 - Oxygen
 - Silicon
 - Magnesium
51. Which of the following is an example of a gas-liquid mixture?
- the air we breathe
 - a carbonated drink
 - soapsuds
 - ice cubes
52. Which state of matter will hold its shape without a container?
- Gas
 - Liquid
 - Solid
 - Plasma
53. The change of a substance from a solid directly to a gas is called?
- condensation
 - melting
 - evaporation
 - sublimation
54. The law of conservation of mass states that mass cannot be?
- burned
 - changed in form
 - created or destroyed
 - heated or cooled
55. During a chemical or physical change, energy may be?
- created
 - destroyed
 - greatly increased in strength
 - converted into another form
56. Identify the scientist(s) that were awarded the Nobel Prize in physics for the discovery of radioactivity in 1903.
- Johannes Geiger, Marie Curie
 - Albert Einstein
 - Antoine-Henri Becquerel, Marie Curie, Pierre Curie
 - Ernest Rutherford, Johannes Geiger
57. Identify the elements discovered by Marie Curie.
- polonium and radium
 - radium and cesium
 - argon and xenon
 - radon and xenon
58. Knowing the chemical properties of a substance will tell you how the substance?
- looks
 - smells
 - can be broken down into atoms
 - reacts with other substances
59. Identify the instrument(s) used to detect radiation.
- film-badge dosimeter
 - Geiger-Muller counter
 - scintillation counter
 - all of the above
60. Which of the following is not an example of a physical property?
- freezing point
 - boiling point
 - reactivity
 - density

61. Which of the following is an example of a chemical change?
- A. ice melting
 - B. paint fading
 - C. pounding gold into a coin
 - D. a puddle of water evaporating
62. Give the conditions for nuclear fusion.
- A. catalyst
 - B. low temperature
 - C. low pressure
 - D. high temperature
63. Which of the following is an example of a physical change?
- A. dissolving salt in water
 - B. burning wood into charcoal
 - C. cooking an egg
 - D. rusting of iron
64. Ice floats in water because it is?
- A. more dense than water
 - B. less dense than water
 - C. colder than water
 - D. warmer than water
65. When water is broken down, what happens to the oxygen and hydrogen atoms it is made of?
- A. They combine with oxygen in air to produce new substances
 - B. They are rearranged to form hydrogen and oxygen gas
 - C. They are destroyed
 - D. They increase in size until they form a solid
66. The tendency of a less dense substance to float in a more dense liquid is called?
- A. viscosity
 - B. density
 - C. sublimation
 - D. buoyancy
67. Dalton's atomic theory stated that every element was made of atoms that could not be subdivided, atoms of the same element are alike, and?
- A. atoms are made of protons, neutrons, and electrons
 - B. the nucleus in center of the atom
 - C. atoms can join to form molecules
 - D. atoms are constantly in motion
68. The charge of an electron is?
- A. -2
 - B. -1
 - C. 0
 - D. +1
69. Atoms have no electric charge because they?
- A. have an equal number of charged and uncharged particles.
 - B. have neutrons in their nuclei
 - C. have an equal number of electrons and protons
 - D. have an equal number of neutrons and protons
70. Ionization refers to the process of?
- A. changing from one period to another
 - B. losing or gaining protons
 - C. turning lithium into fluorine
 - D. losing or gaining electrons
71. Which of the following choices best represents force?
- A. a push or a pull always causing motion
 - B. a push or a pull always causing acceleration
 - C. a push or a pull acting without an object
 - D. a push or a pull acting on an object
72. Identify the thinnest known material.
- A. buckyball
 - B. diamond
 - C. graphene
 - D. fullerene
73. What is a force that opposes motion between two surfaces that are in contact?
- A. friction
 - B. motion
 - C. velocity
 - D. acceleration
74. When two waves interact with the crests of one aligning with the troughs of the other is called
- A. complimentary interference.
 - B. destructive interference.
 - C. opposing interference.
 - D. constructive interference.
75. Dividing the total distance traveled by the total time is how to calculate?
- A. average speed
 - B. average velocity
 - C. average acceleration
 - D. average motion