Part 1 (200 questions - Multiple Choice with 4-5 options).  This packet is divided into 3 sections of 67 or 66 questions each. Please write your team number and bubble in the correct number.

1. If I drop a 50 g mass and a 100 g mass from the same height in a vacuum…

    a. The 100 g mass will hit the ground first because it falls faster.

    b. The 50 g mass will hit the ground first because gravity has to work less to move it.

    c. They will hit the ground at the same time because gravity acts on all objects the same.

    d. You can’t tell which will hit first because you don’t know their shapes.

1. 500 ml of a 50% saltwater solution is mixed with an unknown amount of 25% saltwater solution. This results in a 45% saltwater solution. How much 25% solution was added?

a. 300 mL

b. 150 mL

c. 200 mL

d. 125 mL

1. Which organelle can be described as the “powerhouse” of the cell?

    a. Chloroplast

    b. Lysosome

    c. Golgi apparatus

    d. Mitochondria

1. Who first proposed the idea of continental drift?  
   a. Alfred Wegener

    b. Charles Darwin

    c. Johann Wolfgang von Goethe

    d. Sadi Carnot

1. What process produces the most ATP during cellular respiration?
   1. Calvin cycle
   2. Electron transport chain
   3. Glycolysis
   4. Krebs cycle
   5. Mitochondria
2. Two liquids are combined in a beaker, and a solid is formed. What is this solid called?
3. A hydrate
4. A reactant
5. A salt
6. A solvent
7. A precipitate
8. The ISS is orbiting the earth. The space station is…
   1. Accelerating towards the earth at a rate of 9.8 m/s^2
   2. Accelerating towards the earth at a rate less than 9.8 m/s^2
   3. Accelerating towards the earth at a rate greater than 9.8 m/s^2
   4. Not accelerating, because there is no gravity in space
   5. Not accelerating, because it does not move closer to the earth
9. Trade winds are prevailing winds near the equator that blow....
10. From the northwest and southwest
11. From the northeast and southwest
12. From the northwest and southeast
13. From the northeast and southeast
14. From the north and the south
15. In what process are proteins synthesized using mRNA as a template?  
    a. Translation

    b. RNA replication

    c. DNA replication

    d. Reverse transcription

    e. Transcription

1. In the classification of matter, the two broadest categories are known as \_\_\_\_?

    a. Elements and compounds

    b. Pure substances and mixtures

    c. Pure substances and compounds

    d. Elements and mixtures

    e. Mixtures and compounds

1. A perpetual motion machine would violate which law(s) of thermodynamics?

    a. The first law of thermodynamics

    b. The second law of thermodynamics

    c. The third law of thermodynamics

    d. Both the first and second laws of thermodynamics

e. Both the first and third laws of thermodynamics

     12. Which part of Earth’s atmosphere is inhabited by the most humans?

a. Stratosphere

b. Troposphere

c. Exosphere

d. Mesosphere

e. Thermosphere

      13. Which two carbohydrates have the function of energy storage?

    a. Cellulose and Chitin

    b. Cellulose and Starch

    c. Cellulose and Glycogen

    d. Glycogen and Chitin

    e. Glycogen and Starch

      14. Two molecules have the same molecular formula. They both have double bonded carbon atoms with the same atoms bonded to them, but the atoms vary in their spatial arrangement. What type of isomers are the molecules described?

    a. Cis-trans isomers

    b. Diastereomers

    c. Enantiomers

    d. Structural isomers

    e. The molecules described are not isomers.

      15. The SI unit for force (1 kilogram \* meter per second squared) is known as what?

    a. Joule

    b. Watt

    c. Pascal

    d. Tesla

    e. Newton

    16. When water flows away from the shoreline towards the ocean at a perpendicular or acute angle to the shoreline it is called \_\_\_\_\_\_\_\_\_.

    a. An upwelling

    b. A downwelling

    c. A longshore current

    d. A rip current

    e. A surface current

17. Which of the following nucleic acids are **both** pyrimidines?

    a. Guanine and Cytosine

    b. Adenine and Uracil

    c. Thymine and Guanine

    d. Adenine and Guanine

    e. Cytosine and Uracil

18. A buffer is a solution that minimizes pH changes. How is a buffer created?

    a. The concentration of hydronium ions (H3O+) is increased in a strong base

    b. A strong base is mixed with a strong acid.

    c. The concentration of hydroxide ions (H3O+) is increased in a strong acid

    d. The concentration of hydroxide ions (OH−) is increased in a weak base

    e. A weak acid is mixed with one of its salts

19. What is the formula for velocity?

    a. Distance / Speed

    b. Speed / Time

    c. Time / Distance

    d. Distance / Time

    e. Speed / Distance

20. In the nitrogen cycle, which of the following is produced by ammonification?

    a. NH4+

    b. N₂

    c. NO2+

    d. NO3-

    e. N3H-

21. Which disease is caused by a parasite?

1. Salmonella
2. E. coli
3. Influenza
4. Chicken pox
5. Cyclosporiasis

22. Another term for swallowing food is?

1. Digestion
2. Ingestion
3. Deglutition
4. Peristalsis

23. In Snell’s Law (n1sinθ1 = n2sinθ2), what does “n” stand for?

1. Refractive index
2. Angle of incidence
3. Angle of refraction
4. Normal plane
5. Dispersion

24. Which type of rock is formed when magma cools and hardens?

1. Lava
2. Sedimentary
3. Metamorphic
4. Igneous
5. Crystalline

25. What is the building block for a protein?

1. Monosaccharide
2. Isomer
3. Glycerol
4. Amino acid
5. Nucleotides

26. What is the most electronegative element?

1. Chlorine
2. Fluorine
3. Oxygen
4. Bromine
5. Carbon

27. What is the SI unit for Energy?

1. Joule
2. Meters per second
3. Horse
4. Newton
5. Radians

28. What is the second layer of the earth, starting from the outside?

1. Inner core
2. Outer core
3. Mantle
4. Crust
5. Lithosphere

29. What is the C:H:O ratio in carbohydrates?

1. 1:1:1
2. 2:1:1
3. 2:1:2
4. 1:2:1
5. 2:2:2

30. Which of the following are three types of nuclear decay?

1. Alpha, delta, theta
2. Alpha, beta, gamma
3. Beta, gamma, theta
4. Alpha, beta, zeta
5. Alpha, gamma, delta

31. What is the heat of fusion for water?

1. 334 J/g
2. 2260 J/g
3. 300 J/g
4. 2200 J/g
5. 500 J/g

32. Where is the ozone layer located?

1. Exoshpere
2. Troposphere
3. Stratosphere
4. Mesosphere
5. Thermosphere

33. The principal driving force for protein folding is

1. Hydrophilic interactions
2. Hydrophobic interactions
3. Formation of disulfide bridges between cysteine residues
4. An increase in free energy of the protein and its surroundings

34. Under what conditions is a gas most ideal?

A) High Temperature and Low Pressure

B) Low Temperature and High Pressure

C) Low Temperature and Low Pressure

D) High Temperature and High Pressure

35. A man walks 30 m east and then 40 m north. What is his traveled distance and his displacement?

A.  0 m, 70 m

B.  20 m, 50 m

C.  30 m, 40 m

D.  70 m, 50 m

36. How long does it take for the Earth to go once around its axis?  
A.  12 hours  
B. 24 hours  
C.  1 week  
D.  1 year

37.  A peptide bond is formed through which process?

1. Hydrolysis
2. Protein synthesis
3. Dehydration synthesis
4. Cellular respiration

38.  What differs between isotopes of the same element??

1. Neutrons
2. Electrons
3. Protons
4. Atomic number

39. Who has more potential energy; a skier on top of a mountain or a skier at the mountain base?

1. The skier on the mountain top
2. The skier at the mountain base
3. They have equal potential energy
4. Neither have potential energy

40. The cycle of movement between warm magma and cool magma is known as….

1. Conduction cycles
2. Convection currents
3. Magma currents
4. Magma transfer

41. What color does the chemical Potassium Chloride (KCl) burn?

1. No change
2. Orange
3. Green
4. Purple

42. Which of the following scientists was awarded the Nobel Prize in 1911 for the discovery of the radioactive elements, radium and polonium?

1. Emil Fischer
2. John Dalton
3. Marie Curie
4. Dmitri Mendeleev

43. Which of the following scientists discovered hydrogen gas?

1. Cavendish
2. Pasteur
3. Williams
4. Fischer

44. How many electrons can occupy an “s” orbital?

1. One
2. Two
3. Three
4. Four

45. Which of the following is a type of non-vascular plant?

1. Ferns
2. Angiosperms
3. Conifers
4. Algae

46. What is the chemical name of H2SO3?

1. Sulfuric acid
2. Sulfurous acid
3. Sulfide
4. Sulfate

47. What is Fourier Transform Spectroscopy about?

1. Taking the final resulting wave and splitting it into what the original waves looked like before they were superimposed on each other.
2. Splitting electric fields in a magnetic field.
3. Observing electron transitions and determining the atom that the wave originated from.
4. Using light as a source to study the interactions between coherent light and matter.

48. A Lagrange point always refers to the:

1. Point at which the center of mass between two objects is located.
2. Point where the Roche lobes meet between two massive objects in space.
3. Area where the combined gravitational forces of two bodies equal the centrifugal force.
4. Satellite of any large body, manmade or natural, that revolves around this body with the same period as its rotation.

49. Which of the following is NOT a characteristic of mammals?

1. Are carnivores
2. Are vertebrates
3. Produce milk
4. Have hair

50. What group on the Periodic Table has the most reactive metals?

1. Rare Earth Metals
2. Alkaline-Earth Metals
3. Alkali Metals
4. Transition Metals

51. Which of the following is NOT a fundamental force?

1. Weak Force
2. Magnetism
3. Gravity
4. Strong Force

52. What is the most abundant element in the Earth's crust?

1. Oxygen
2. Iron
3. Silicon
4. Carbon

53. The condition in which the liver becomes infused with fibrous tissue and is unable to repair itself is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_

A. Hepatitis

B. Cirrhosis

C. Jaudice

E. Hepatoma

54. Which mineral has a metallic luster, a black streak and is an ore of iron?

A. Galena

B. Magnetite

C. Graphite

D. Pyroxine

55. Which rock is sedimentary in origin and formed as a result of chemical processes?

A. Granite

B. Shale

C. Breccia

D. Dolostone

56. Tearing paper into pieces is an example of what kind of change?

A. A change in mass

B. A physical change

C. A chemical change

D. A change in energy

57. If the salt content of a cell is greater than that of its surroundings, water will

1. Move into the cell through osmosis
2. Move out of the cell through osmosis
3. Move into the cell through diffusion
4. Move out of the cell through diffusion

58. Charles’ Law describes the relationship between

1. The pressure and volume of an ideal gas
2. The temperature and pressure of an ideal gas
3. The temperature and volume of an ideal gas
4. None of these things

59. A ball is thrown straight up in a frictionless vacuum. Assuming a gravitational constant of 9.8, which of the following best describes the ball at the apex of its flight?

1. It has no velocity but is accelerating downwards
2. It has kept its initial velocity and is undergoing no acceleration
3. It has no velocity and is undergoing no acceleration
4. None of these describe the ball

60. The approximate average temperature of Earth’s core is

1. 1,000 K
2. 3,000 K
3. 6,000 K
4. 12,000 K

61. The chemical equation for photosynthesis is:

1. 3CO2 + 3H2O —> C6H6O3 + 3O2
2. 6CO2 + 6H2O —> C6H12O6 + 6O2
3. CO2 + H2O —> C6H2O6 + 6O2
4. 6CO2 + 6H2O —> C2H12O2 + 6O2

62. The molar mass of Helium is

1. 3.8 u
2. 1 u
3. 4 u
4. 2 u

63. Trini adds 10 g of baking soda to 100 g of vinegar. The mixture begins to bubble. When the bubbling stops, Trini finds the mass of the resulting mixture. She determines its mass is 105 g. Why has the mass changed?

1. A gas has left the mixture
2. Vinegar evaporated during the experiment
3. Mixtures are always less massive than their parts
4. Mass is destroyed when vinegar reacted with baking soda

64. According to the 10% rule, how much energy is retained for tertiary consumers if 1,000,000J of sunlight are produced in the food web?

1. 10J
2. 100J
3. 10000J
4. 1000J

65. What colors show up during a gram staining?

1. Purple and Blue
2. Pink and Green
3. Green and Blue
4. Purple and Pink

66. What is Avogadro’s number rounded to 3 decimal points?

1. 6.022 \* 10^23
2. 6.052 \* 10^23
3. 6.037 \* 10^23
4. 6.019 \* 10^23

67. Which type of lever is a seesaw?

1. 1st class
2. 2nd class
3. 3rd class
4. It isn’t lever

END OF PART 1A

BEGIN PART 1B

1. Where are the Hadley Cells in meteorology located?

1. Between 30 degrees and 60 degrees
2. The Hadley Cells don’t exist
3. Between the Equator and 30 degrees
4. Between 60 degrees and the Polar Ice Caps

2. Which of these materials is NOT a major component of the plasma membrane?

1. Phospholipids
2. Glycoprotein
3. Proteins
4. DNA

3. Which of the following is an Alkali Metal

1. Sodium
2. Hydrogen
3. Tin
4. Calcium

4. What muscle is part of the calf muscle?

1. Gastrocnemius
2. patella tendon
3. Quadricep
4. Achilles

5. Approximately how many angstroms is the diameter of an Hydrogen atom?

1. one-millionth of an angstrom
2. one-thousanth of an angstrom
3. one-hundreth of an angstrom
4. one angstrom

6. A pound-force is \_\_\_ a Newton?

1. greater than
2. less than
3. equal to
4. not the same dimensions

7. The free-air correction is

1. related to density of rocks
2. related to Earth's elliptical shape and rotation
3. related to elevation
4. related to the terrain

8. The largest organ of the body is the

a.      Liver

b.      Colon

c.       Epidermis

d.      Lungs

9.  In the laboratory, Austin is given a mixture of iron filings, sand, and salt. To separate the mixture, Austin uses a magnet, boiling water, and a filter. Which statement is true about the process Austin uses to separate this mixture?

a.       Austin uses only physical changes to separate the mixture’s components

b.      Austin uses only chemical changes to separate the mixture’s components

c.       Austin uses both physical and chemical changes to separate the mixture

d.      Austin uses neither physical nor chemical changes to separate the mixture

10. The mass of a high mass star is \_\_\_\_\_ solar masses

a.       4-8

b.      >12

c.       <6

d.      >8

11. The region between two biomes, such as the savannah, is called

a.       Ecobine

b.      Ecozone

c.       Ecological Shift

d.      Ecotone

12. Second stage of cell replication is:

a.       Prophase

b.      Metaphase

c.       Anaphase

d.      Cytokinesis

13.  When a system is at equilibrium, \_\_\_\_\_\_\_\_\_\_?

a.       The reverse process is spontaneous but the forward process is not

b.      the forward process and the reverse processes are both spontaneous

c.       the forward process is spontaneous by the reverse process is not

d.      the process is not spontaneous in either direction

e. both forward and reverse processes have stopped

14. The wavelength of electromagnetic waves for gamma rays is from 1\*10-12 m to \_\_\_\_\_\_\_\_\_

a.       1 um

b.      100 um

c.       1\*10-11

d.      2 m

15.      The only nutrient cycle that does not have an atmospheric component –

a.       Carbon

b.      Sulfur

c.       Phosphorous

d.      Water

16. Which organelle(s) participate(s) in respiration?

a.       Mitochondria

b.      Cytoplast

c.       Ribosomes

d.      A and B

e.       All of the Above

17. Young’s Modulus models

a.       Stress/strain

b.      Force/area

c.       N/Kg

d.      Distance/time

18. The entropy of the universe is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

a.       Constant

b.      Continually decreasing

c.       Continually increasing

d.      Zero

19. The two types of lava are

a.       Magma and lava

b.      Covfefe and Aa

c.       Pahoehoe and submarine

d.      Pahoehoe and Aa

20.  What does ATP stand for?

a.       Adenine Thymine Phosphorous

b.      Adenine triphosphate

c.       Adenosine triphosphate

d.      Animals Try Protein

21.  Balance the equation: H2 + O = H2O

a.       2H2 + O = 2H2O

b.      2H2 + O2 = 2H2O

c.       H2 + O2 = 2H20

D.     It is already balanced

22.  The Law of Reflection states that:

a.       Beams lose intensity once reflected

b.      The angle of incidence equals the angle of reflection

c.       Two beams intersecting will cancel each other out

d.      You are prettier in a mirror than in real life

23.  The highest layer of the atmosphere is the

a.       Exosphere

b.      Troposphere

c.       Stratosphere

d.      Lithosphere

24. How many carbons does propane have?

1. 2
2. 3
3. 6
4. 7

25. What part of a plant allows gas to enter and exit the leaf?

1. Stomata
2. Pistil
3. Sepals
4. Anther

26. How many mL of water are in 300 grams of water at STP?

1. 3 grams
2. 30 grams
3. 300 grams
4. 3000 grams

27. When ΔG is less than zero, a chemical reaction is:

1. Spontaneous
2. Nonspontanious
3. Spontaneous only at high temperatures
4. Spontaneous only at relatively low temperatures

28. Of the following biological levels of organization, what represents the smallest or lowest level ?

1. Organs
2. Populations
3. Cells
4. Organisms
5. Tissues

29. A molecule with the formula C3H8 is a(n):

1. Hexane
2. Propane
3. Decane
4. Butane

30. When two continental plates collide, a(n) \_\_\_\_\_ forms.

1. Valley
2. Mountain
3. Volcano
4. Underwater volcano

31. Which of the following statements is wrong? I. A body can have a constant speed but a varying velocity. II. A body can have a constant velocity but a varying speed. III. A body can have a zero velocity and finite acceleration.

1. I only
2. III only
3. None of these
4. II only

32. What is not true about momentum?

1. It is the product of the mass and the velocity of the body
2. It is a vector quantity whose direction is the same as that of the velocity
3. It is a force
4. The SI unit is kilogram meter per second

33. To which superfamily do ants belong?

1. Hornets
2. Wasps
3. Bees
4. Arachnids

34. A cell in a hypotonic environment is most likely to:

1. Contract
2. Expand
3. Thrive
4. Not respond

35. Which of the following is the largest layer in the Earth?

1. Inner core
2. Outer core
3. Mantle
4. Crust

36. Which of the following is the most ideal conditions for flying an airplane?

1. Warm/humid air
2. Warm/dry air
3. Cold/humid
4. Cold/dry air

37. The charge of an atom is determined by the ratio of:

1. Protons/neutrons
2. Protons/electrons
3. Electrons/protons
4. Neutrons/electrons

38. Which of the following terms is MOST commonly used to refer to the copying of DNA during the cell cycle:

1. Duplication
2. Replication
3. Translation
4. Complementation

39. Meanders are typically associated with:

1. turbulent rivers
2. low-gradient streams
3. V-shaped valleys
4. alluvial fans

40.Which of the following is LEAST accurate regarding the element helium:

1. it is the second most abundant element in the universe
2. it is constantly escaping from Earth’s atmosphere into space
3. it is toxic to humans even in very low concentrations
4. it is a noble gas

41.To a person standing on shore, an object dropped from the mast of a passing sailboat will trace what path, assuming negligible air resistance. Is it:

1. vertical straight line
2. slanted straight line
3. Parabola
4. Hyperbola

42. From the following biological levels of organization, which one represents the smallest:

1. Organs
2. Populations
3. Cells
4. tissues

43. Total distance covered in total time taken is termed as

1. instantaneous speed
2. average speed
3. uniform speed
4. variable speed

44.Which of the following gases has the weakest attractive forces between particles?

1. CO2
2. He
3. NO
4. HCl

45. A mass of rock formed when a large body of magma cools inside the crust is called a:

1. Neck
2. Dike
3. Lava plateau
4. Batholith

46. Protons have a \_\_ charge.

1. Positive
2. Neutral
3. Negative
4. Negative and positive

47. What is the most basic pH?

1. 1
2. 7
3. 17
4. 14

48. Which noble gas has the highest melting point?

1. Argon
2. Krypton
3. Xenon
4. Radon

49. A poise is the unit of measure for which of the following?

1. Pressure
2. Viscosity
3. Force
4. Mass

50. Which of these do not contain nucleic acids?

1. Chloroplast
2. Prion
3. Virus
4. Archaea
5. None of the above

51. What number is defined as the number of atoms in 12 grams of the isotope carbon-12?

1. Graham’s number
2. Skewe’s number
3. Tau
4. Avogadro’s number

52. In simple harmonic motion involving a spring, the acceleration of the object is directly proportional to the \_\_\_\_\_\_\_\_.

1. Displacement
2. Velocity
3. Mass
4. Spring size

53. Which of these minerals is highest on the Moh’s scale?

1. Feldspar
2. Topaz
3. Corundum
4. Apatite

54. What does molar mass mean?

1. The mass of a small mammal
2. The mass of a square, flat tooth
3. The mass of an atom
4. The mass of a certain number of atoms of the same element

55. If two cars collide, one being a truck, and the other being a smart car, which exerts more force on the other?

1. Smart Car
2. Truck
3. Both the same
4. Cannot be determined

56. What are the 4 layers of the earth in order (outside to inside)

1. Crust, Mantle, Outer Core, Inner Core
2. Bedrock, Magma, Iron, Molten Iron
3. Crust, Median, Core, Gravitational Center
4. Icing, Vanilla Cake, Inner Icing, Chocolate Cake

57. What is the name of a singular stack of thylakoids

1. Chlorophyll
2. Grana
3. Chloroplasts
4. Granum

58.  What type of reaction is the following: 2 AgNO3  +  BaSO4    Ba(NO3)2  +  Ag2SO4

a.      Single replacement

b.      Double replacement

c.      Acid base

d.      Synthesis

e.      Decomposition

59. Which of the following molecules are polar?

a.      CCl4

b.      CO2

c.      H2O

d.      Oil

e.      H2

60.  How many atoms are in 1.00 moles of Br2?

a.      80

b.      160

c.      6.022 x 1023

d.      1.204 x 1024

e.      You cannot count them

61.   What is the name of CuCl2?

a.      Copper chloride

b.      Copper dichloride

c.      Copper (I) chloride

d.      Copper (II) chloride

e.      Copper chlorine

62.  Which of the following is an ionic compound?

a.      H2O

b.      CF4

c.      BaCl2

d.      NH3

e.      CO

63.   How many mL are in 1.00 hL?

a.      1 x 103 mL

b.      1 x 104 mL

c.      1 x 105 mL

d.      1 x 106 mL

e.      1 x 107 mL

64.  What is the density of an object that has a mass of 5.25 g and a volume of 75.0 mL?

a.      394 g·mL

b.      0.070 g/mL

c.      70.0 g/L

d.      14.3 mL/g

e.      0.0143 L/g

65.      Which of the following is a homogenous mixture?

a.      Sand on the beach

b.      Sugar water

c.      Muddy water

d.      Lucky Charms cereal

e.      Italian salad dressing (needs to be shaken)

66.      Which of the following is a physical change?

a.      Boiling ethanol

b.      Rust forming on a bike

c.      Baking a cake

d.      Burning magnesium

e.      Pennies fizzing when in vinegar

67.   What type of reaction makes CO2 (g) and H2O (g) as the products

a.      Synthesis

b.      Combustion

c.      Single replacement

d.      Double replacement

e.      Decomposition

135.      A greenhouse gas produced by cows and certain bacteria is

a.      Oxygen

b.      Ethane gas

c.      Methane gas

d.      Carbon monoxide

e.      Nitrogen

136.      The outer protein coat of a virus is called a(n)

a.      Bacteriophage

b.      Capsid

c.      Amino Acid

d.      Shield

e.      Sheath

137.      Which of the following characteristics of living things is NOT true about viruses?

a.      Obtain and use energy

b.      Grow and develop

c.      Respond to stimuli

d.      Contain genetic material

e.      Evolve

138.      A student is collecting the gas given off from a plant in bright sunlight at a temperature of 27 degrees Celsius. The gas being collected is

a.      ATP

b.      Glucose

c.      Carbon dioxide

d.      Nitrogen

e.      Oxygen

139.      If carbon dioxide is completely removed from a plant’s environment, what would you expect to happen to the plant’s production of high-energy sugars?

a.      More sugars will be produced

b.      No sugars will be produced

c.      The same amount of sugars will be produced but without carbon dioxide

d.      Fewer sugars will be produced at first, but then the plant will recover

140.      Place these steps of enzyme catalysis in the correct order:

1.      The substrate and enzyme change shape

2.      The substrate enters the active site

3.      The enzyme reverts to its original configuration

4.      The product is expelled

a.      1, 2, 3, 4

b.      2, 3, 1, 4

c.      2, 1, 4, 3

d.      2, 1, 3, 4

e.      4, 3, 2, 1

141.      All of the following are characteristics of mitochondria and chloroplasts EXCEPT:

a.      Both possess their own DNA

b.      Both are surrounded by a double membrane

c.      Both can capture the energy of sunlight

d.      Both likely evolved from prokaryotic bacteria

e.      Both are involved in energy conversion

142.      If you placed a freshwater fish into a saltwater tank, you would be placing the fish in a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ environment.

a.      Hypertonic

b.      Hypotonic

c.      Isotonic

d.      Plasmotonic

e.      Osmotonic

143.      What would happen if a nurse gave a patient an IV of pure water?

a.      Their blood cells would shrink

b.      Their blood cells would burst

c.      The patient would slowly become rehydrated

d.      The nurse would be promoted for outstanding medical care

e.      There would be no impact on the patient’s cells

144.   Which of the following enclose their DNA in a nucleus?

a.      Prokaryotes

b.      Bacteria

c.      Eukaryotes

d.      Viruses

e.      Ribosomes

145.      The \_\_\_\_\_\_\_\_\_\_\_ forms the relatively cool, brittle plates of plate tectonics?

a.      Lithosphere

b.      Asthenosphere

c.      Troposphere

d.      Earth

e.      None of the above

146.      \_\_\_\_\_\_\_\_\_\_\_\_ rock forms from the crystallization of molten magma?

a.      Sedimentary

b.      Indigenous

c.      Primary

d.      Igneous

e.      None of the above

147.      \_\_\_\_\_\_\_\_\_\_\_ is often rephrased as “the present is the key to the past”?

a.      Biblical prophecy

b.      Uniformitarianism

c.      Aristotle logic

d.      Science Olympiad

e.      None of the above

148.      \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_, are 3 different types of silicates?

a.      Tectosilicates, Inosilicates, Sorosilicate

b.      Nesosilicate, Cyclosilicate, Phyllosilicate

c.      Igneous silicate, Metamorphic silicates, Sedimentary silicates

d.      A & B

e.      None of the above

149.      The composition of the earth’s core is believed to be \_\_\_\_\_\_?

a.      Basalt

b.      Granite

c.      Peridotite

d.      Solid iron-nickel alloy

e.      None of the above

150.      What is the chemical formula of Halite?

a.      PbJ

b.      MnM

c.      NaCl

d.      KCl

e.      None of the above

151.      What type of rock is Magnetite?

a.      Igneous

b.      Metamorphic

c.      Sedimentary

d.      Gemstone

e.      None of the above

152.      What type of rock is Sandstone?

a.      Clastic

b.      Igneous

c.      Sedimentary

d.      A & C

e.      None of the above

153.      The definition of geology is?

a.      the science that deals with the earth's physical structure and substance, its history, and the processes that act on it.

b.      the branch of science concerned with the nature and properties of matter and energy. The subject matter of physics, distinguished from that of chemistry and biology, includes mechanics, heat, light and other radiation, sound, electricity, magnetism, and the structure of atoms.

c.      the branch of science that deals with the identification of the substances of which matter is composed; the investigation of their properties and the ways in which they interact, combine, and change; and the use of these processes to form new substances.

d.      the study of living organisms, divided into many specialized fields that cover their morphology, physiology, anatomy, behavior, origin, and distribution.

e.      None of the above

154.   Which minerals is the favorite of the person that wrote this question (HINT: IT IS A SULFATE)?

a.      Quartz

b.      Magnetite

c.      Sulfur

d.      Celestite

e.      None of the above

155. Which of the following is not a strong acid?

1. HCl
2. HNO3
3. H2SO4
4. HF
5. HClO4

156. Which of the following is defined as the support force perpendicular to the surface it contacts?

1. Normal Force
2. Gravitational Force
3. Frictional Force
4. Tension Force
5. Contact Force

157. Which of the following is not a macromolecule?

1. Carbohydrate
2. Protein
3. Nucleic Acid
4. Lipid
5. Peptide

158. Which of the following is not a simple machine?

1. Lever
2. Conveyor Belt
3. Pulley
4. Inclined Plane
5. Wedge

159. What is the molar mass of Helium (in g/mol)?

1. 1
2. 2
3. 3
4. 4
5. 5

160. Which of the following particles is not in an atom?

1. Proton
2. Neutron
3. Molecule
4. Electron

161. What are the units for the coefficient of static friction?

1. Kg
2. N/m^2
3. W
4. N/m
5. No units

162. What is commonly known as “the powerhouse of the cell”?

1. Mitochondria
2. Chloroplast
3. Nucleus
4. Ribosome
5. Lysosome

163. Where is the pituitary gland found?

1. Liver
2. Kidney
3. Heart
4. Brain
5. Lungs

164. What is the acceleration due to gravity on Earth (ft/sec^2)

1. 8
2. 16
3. 32
4. 64
5. 9.8

165. How many tentacles does an octopus have?

1. 0
2. 2
3. 6
4. 8
5. 10

166. A person has 7 neck vertebrae, how many does a giraffe have?

1. 0
2. 7
3. 14
4. 23
5. 70

167. In physics, a vector is a quantity that has\_\_\_\_\_.

1. magnitude and time
2. magnitude and direction
3. time and direction
4. time only
5. magnitude only

168. What is the minimum resultant possible when adding a 3m vector to an 8m vector?

1. 0m
2. 3m
3. 5m
4. 11m
5. 24m

169. What is the maximum resultant possible when adding a 3m vector to an 5m vector?

1. 0m
2. 2m
3. 3m
4. 8m
5. 15m

170. An unfortunate insect splatters against the front of a moving truck.  Compared to the force of the truck on the insect, the magnitude of the force of the insect on the truck is \_\_\_\_\_\_\_\_\_\_\_\_\_\_?

1. larger
2. smaller
3. the same
4. All of the above
5. None of the above

171. An unfortunate insect splatters against the front of a moving truck.  Compared to the acceleration of the truck, the magnitude of the acceleration of the insect \_\_\_\_\_\_\_\_\_\_\_\_\_\_?

1. larger
2. smaller
3. the same
4. All of the above
5. None of the above

172. The metric unit of weight is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. slug
2. pound
3. joule
4. newton
5. kilogram

173. The metric unit of mass is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. slug
2. pound
3. joule
4. newton
5. Kilogram

174.     A glass rod is rubbed with a piece of silk.  During the process the glass rod acquires a positive charge and the silk

a.      acquires a positive charge also.

b.      acquires a negative charge.

c.       remains neutral.

d.      could either be positively charged or negatively charged.  It depends on how hard the rod was rubbed.

175.      Two charged objects attract each other with a certain force.  If the charges on both objects are doubled with no change in separation, the force between them

a.      quadruples.

b.      doubles.

c.       halves.

d.      increases, but we can't say how much without knowing the distance between them.

176.      If you have a box with sides of 25 cm by 28 cm by 18 cm full of a liquid that has a mass 20 kg, what is the density of the liquid?

a.      2500 kg/m3

b.      630 kg/m3

c.       0.00178 kg/m3

d.      1590 kg/m3

177. A model rocket is pushed upwards by a force of 6 Newtons for a period of 4 seconds.  What is the impulse delivered to the rocket?

1. 12 Ns
2. 3 N/s
3. 0.33 s/N
4. 8 Ns
5. 24 Ns

178.   A unit of pressure is called a

a.      Bernoulli.

b.      Pascal.

c.       Pound.

d.      Meter.

e.      Newton.

179.      A solid cylinder which has a mass of 25 kg and a radius of 0.2 m, rotates with constant angular acceleration about a fixed axis.  At time t = 0 s, the cylinder is at rest.  At time, t = 2.0 s, its angular velocity is 1.0 rad/s. What is the angular acceleration of the cylinder between t = 0 s and t = 2 s?

a.      0.5 rad/s2

b.      1.0 rad/s2

c.       2.0 rad/s2

d.      3.0 rad/s2

e.      4.0 rad/s2

180.      If you are driving with a negative velocity and you step on the gas pedal, the acceleration is

a.      positive

b.      negative

c.       zero

d.      left

e.      None of the above

181.      An object is released from rest and falls in the absence of air resistance. Which of the following is true about its motion?

a.      Its acceleration is zero

b.      Its acceleration is constant

c.       Its velocity is constant

d.      Its acceleration is increasing

e.      Its velocity is decreasing

182.      Suppose that a train whistle at rest has a frequency of 3000 Hertz. If you are standing still and observe the frequency to be 3010 Hertz (higher pitch), you can conclude that

a.      the train is moving away from you.

b.      the train is moving toward you

c.       the sound from the whistle has echoed

d.      not enough information is given

183.      Frequencies of sound that are too high for the human ear to hear are called

a.      supersonic

b.      infrasonic

c.       ultrasonic

d.      subsonic

e.      sonic drive-in

184.   Which of these waves has the longest wavelength?

a.      Green visible light

b.      Ultraviolet

c.      Infrared

d.    Microwave

e.    Red visible light

185.   Which is the name of the sharp pieces of a rose bush that are used to protect the plant?

a.      Petals

b.      Quills

c.      Needle

d.    Prickle

e.   Thorn

186. What is the study of living organisms?

1. Chemistry
2. Earth Science
3. Biology
4. Physics

187. What is the branch of science that deals with the identification of the substances of which matter is composed, the investigation of their properties, and the ways in which they interact?

1. Earth Science
2. Chemistry
3. Biology
4. Physics

188. What the branch of science concerned with the nature and properties of matter and energy?

1. Physics
2. Chemistry
3. Biology
4. Earth Science

189. What is the branch of science dealing with the physical constitution of the earth and its atmosphere?

1. Biology
2. Physics
3. Chemistry
4. Earth Science

190. What area has the largest tidal range?

1. San Francisco Bay
2. Arctic Circle
3. Bay of Bengal
4. Bay of Fundy
5. Strait of Gibraltar

191. In what type of unconformity is there no evidence of erosion?

1. Paraconformity
2. Disconformity
3. Chrono-conformity
4. Non-conformity
5. Angular unconformity

192. When glaciers begin to melt, the gases trapped within the ice’s surface is released, producing a sound. What is this sound called?

1. Crevasse Escapement
2. Fizzle
3. Bergy Seltzer
4. Carbonation
5. Zungenbecken

193. What drives seafloor spreading?

1. The Sun
2. Sedimentary deposition
3. Oceanic trenches
4. Convection currents
5. Earth’s magnetic field

194. Which of the following describes a mixture of water and ash that flow down the slope of a volcano?

1. Avalanche
2. Lahar
3. Mudslide
4. Lava
5. Fumerole

195. The opening at the top of a volcano is called?

1. Crater
2. Laccolith
3. Magma chamber
4. Ash layer
5. Hole

196. Who is considered to be the father of modern geology?

1. Alfred Wegener
2. Charles Darwin
3. Andrija Mohorovičić
4. James Hutton
5. Louis Agassiz

197. Which of the following describes the point at the surface of the earth directly above where the earthquake rupture started?

1. Hypocenter
2. Topographic center
3. Seismic center
4. Focus
5. Epicenter

198. What is the largest galaxy we know of?

1. Messier 31
2. NGC1227
3. IC 1011
4. Messier 87
5. None of the above

199. What is the surface temperature of the sun?

1. ~5800K
2. ~5800°C
3. ~9650K
4. ~9650°C
5. Hot

200.

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Part 1 Key:

1. C
2. D
3. D
4. A
5. A
6. B
7. C
8. D
9. B
10. E
11. B
12. D
13. A
14. B
15. D
16. B
17. E
18. A
19. E
20. D
21. E
22. E
23. D
24. A
25. E
26. C
27. A
28. D
29. D
30. B
31. D
32. C
33. D
34. B
35. A
36. C
37. B
38. A
39. B
40. B
41. C
42. A
43. A
44. B
45. D
46. C
47. A
48. B
49. D
50. B
51. A
52. C
53. A
54. C
55. B
56. A
57. A
58. C
59. A
60. C
61. B
62. C
63. D
64. A
65. D
66. A
67. A
68. C
69. D
70. A
71. A
72. D
73. A
74. C
75. C
76. C
77. D
78. D
79. B
80. D
81. C
82. C
83. D
84. A
85. D
86. D
87. C
88. B
89. B
90. A
91. B
92. A
93. C
94. A
95. A
96. B
97. B
98. D
99. C
100. B
101. B
102. C
103. D
104. B
105. B
106. B
107. C
108. C
109. C
110. B
111. B
112. D
113. A
114. D
115. D
116. B
117. B
118. D
119. A
120. C
121. D
122. C
123. A
124. D
125. B
126. C
127. C
128. D
129. C
130. C
131. B
132. B
133. A
134. B
135. C
136. B
137. A
138. E
139. B
140. C
141. C
142. A
143. B
144. C
145. A
146. D
147. B
148. D
149. D
150. C
151. E
152. D
153. A
154. D
155. D
156. A
157. E
158. B
159. B
160. C
161. E
162. A
163. D
164. C
165. A
166. B
167. B
168. C
169. D
170. C
171. A
172. D
173. E
174. B
175. B
176. D
177. E
178. B
179. A
180. A
181. B
182. B
183. C
184. D
185. D
186. C
187. B
188. A
189. D
190. D
191. A
192. C
193. D
194. B
195. A
196. D
197. E
198. C
199. A
200. ,

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Part 2 Questions:   (include your question followed by the answer)

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1. The genus Ophisaurus consists of a group of legless-lizards that resemble snakes.  What physical characteristic could you observe about one of these lizards that would indicate that this is not a snake.  *Answer:  Moveable eyelids or external ear openings.*
2. An ecological interaction in which a member of one species harms a member of another species without gaining any benefit is known as what? *Answer: Ammensalism*
3. Geology is a study that encompasses the study of both rocks and minerals. What is the individual study of minerals alone known as? *Answer: mineralogy* **i dont know if this question is actually good i ran out of ideas, could be reworded for the study of rocks: petrology ~patti**
4. What is the valence of oxygen? *Answer: 2*
5. What is a large, but weak red flash that can appear above active thunderstorms and often appears at the same time as a powerful positive cloud to ground lightning strike? *Answer: Red Sprite*
6. Cornstarch reacts with what solution, forming a dark purple color? *Answer: iodine*
7. What are the three parts of an epidemiological triangle? *Answer: agent, host, environment*
8. Old world monkeys, those found throughout Asia and Africa, and new world monkeys, those found throughout South America, have a defining difference. What is the biological feature that distinguishes new world and old world monkeys? *Answer: Prehensile Tails*
9. How many times more acidic is gastric acid, with a pH of 3, to water, with a pH of 7? *Answer: 10,000 times more acidic*
10. What famous experiment allowed scientists Robert Millikan and Harvey Fletcher to measure the elementary charge? *Answer:* *Oil drop experiment*
11. At a distance of 1R from a planet’s surface, the gravitational field strength is 6 N/kg. R is the radius of the planet. What is the gravitational field strength at a distance of 2R from the surface? *Answer: 8/3 N/kg*
12. Food is moved through the esophagus using what type of muscle movement? *Answer: peristalsis*
13. What is the product in the bicarbonate buffer system as a result of a chemical reaction combining H2O and CO2? *Answer: carbonic acid*
14. To the nearest degree, what is 300 Kelvin in Celsius? *Answer: 27℃*
15. What are the three smallest bones in the human body? *Answer: malleus, incus, stapes*
16. Suppose I already have 1L of 12M HCl in my beaker. How much water should I add to my beaker to get a final concentration of 3M? *Answer: 3 L (slightly tricky because you must remember to subtract the the 1L already existing in the beaker from the answer!)*
17. If an animal cell with a 0.9% NaCl content is put into an area with a 0.1% NaCl content, it may burst due to which property? *Answer: Osmosis*
18. Plants use these properties of water to help get water up their stems. *Answer: cohesion and adhesion*
19. How long does it take for the moon to travel a full orbit around the earth? *Answer: 27 days.*
20. What percentage of the sun is made up of hydrogen? *Answer: 70%*
21. Down’s Syndrome is characterized by the extra presence of what in the cell? *Answer: Chromosome 21*
22. A property known to be exhibited by all objects that produce a gravitational field around them, affecting all other objects with this specific property, also theorized to be a result of the existence of the Higgs boson, as well as being a property that allows physicists to measure the object’s resistance to acceleration, is known as what? *Answer: mass*
23. *What fundamental force is responsible for beta radiation? Answer: Weak Force*
24. *What is the name of the logical operator that inverts the input? Answer: "Not operator", "Not gate"’*
25. A bacteria population doubles every hour. If I leave 1 bacteria in a petri dish, how many will be there in 5 hours. *Answer: 32*
26. What famous scientist proved the germ theory of disease by using heat to kill bacteria in a liquid? (Hint: His name is on every gallon of milk) *Answer: Louis Pasteur*
27. What is the magnitude of the velocity of a ball in freefall 5 seconds after release? Assume a gravitational acceleration of 9.8 m/s/s. *Answer: 49 m/s*
28. An ideal gas is in a sealed container with a volume of 3L, pressure of 1.3 atm, and a temperature of 227 K. The temperature is increased 23 K. Assuming volume remains constant, what is the new pressure of the gas. Give your answer in kPa *Answer: 1.5 x 10^2 kPa*
29. What is the process of replicating chromosomes known as? *Answer: Mitosis*
30. Who developed the theory of seafloor spreading? *Answer: Harry Hess*
31. Mold secretes a toxic substance that is bad for humans. What is it called? *Answer: Mycotoxins*
32. What type of acid is in endospores that makes endospores resistant to heat? *Answer: Dipicolinic Acid*
33. Convert 2 Newton-Metre to Joules. *Answer: 2 Joules*
34. Rounded to the nearest integer, how many seconds does it take for a 1 kg ball to fall 490 meters from rest on Earth? *Answer: 10 seconds*
35. If the ISS is 400 km above the surface of the earth, what is the acceleration due to gravity on the ISS? (Round to the nearest whole number) (9 m/s^2)
36. What are the transport systems called in a plant stem? What does each one transport, and how does this affect the plant’s survival? (xylem and phloem, water and solutes/food, respiration and photosynthesis are enabled)
37. 1000 cal = how many Joules? (4180 J)
38. What experiment proved the existence of a nucleus in the atom? (Rutherford’s gold foil experiment)
39. Briefly explain the Calvin Cycle. Include the words “RuBP”, “NADPH”, “ATP”, and “Glucose” in your response. (Sample Answer: The reactions of the Calvin cycle add carbon (from carbon dioxide in the atmosphere) to a simple five-carbon molecule called RuBP. These reactions use chemical energy from NADPH and ATP that were produced in the light reactions. The final product of the Calvin cycle is glucose.)
40. What is Homeostasis? (An organism maintaining precise internal conditions under changing circumstances)
41. What type of vehicle is Bernoulli's principle most used? Answer: airplanes
42. A metal and nonmetal form what kind of bond? Answer: Ionic
43. What is the primary oxygen-carrying protein found in red blood cells? answer: Hemoglobin
44. What is the SI base unit for mass? answer:Kilogram
45. What is the specific heat of water? Answer: 4.184J/g
46. What is the standard temperature in Kelvins in chemistry(STP)? Answer: 273K
47. The only elements that are liquid at room temperature are? Answer: Bromine and Mercury
48. What is the most abundant element in the universe? Answer: Hydrogen
49. The phospholipid bilayer composes which part of a cell? Answer: the membrane
50. Heisenberg’s uncertainty principle states what? Answer: One can never know the exact position and the exact speed of an object at the same time
51. The prefix nano- represents 10 to what power? Answer: -9
52. What are the two types of photoreceptors in human eyes? Answer: rods and cones
53. How big is a Hydrogen atom? *Answer: 53 Picometers (1e-12 meters)*
54. What is the ideal gas constant with units of (L\*atm)/(mol\*K)? *Answer: 0.08206*