High School Science

General Information:

- **DO NOT** open the test booklet and **DO NOT** start until the proctor says "begin."
- Each individual exam period will be 40 minutes and each exam contains 50 multiple choice questions.
- Students are allowed to use a non-programmable battery operated calculator during the individual and team exams.
- Students are encouraged to write on the exam booklet. Scratch paper and pencils will also be provided.
- Students will not be permitted to leave the test room while the test is in progress. If a student finishes early, he/she must remain in the test room until the exam period is completed.
- If you need to ask a question during the test, raise your hand and the proctor will come to you.
- There is no penalty for skipping a problem. The exam scores will be determined by the number of correct answers. All ties will be broken by awarding the place to the contestant who has the most consecutive correct answers before a problem is missed.
- **Students may NOT keep the test booklet.**

For each of the following questions mark the **BEST** answer on the answer sheet.

1. Which of the following is absent in an animal cell?
   a. Cell Wall **b.** Plasma Membrane **c.** Ribosomes **d.** Mitochondrion

2. Which of the following is NOT a step a virus takes while attacking host cells.
   a. Transportation **b.** Transcription **c.** Binding **d.** Assembly

3. Which of the following kingdoms are prokaryotic cells found in?
   a. Protista **b.** Plantae **c.** Fungi **d.** Monera

4. _____ is the nuclear division during which duplicated chromosomes are evenly distributed into two daughter nuclei.
   a. Meiosis **b.** Mutation **c.** Mitosis **d.** Fusion

5. Which of the following is not a part of the nucleotide in DNA?
   a. Enzymes **b.** Deoxyribose **c.** Phosphate group **d.** Nitrogen base

6. How is a theory different from a hypothesis?
   a. It has been tested many times and has not been disproved.
   b. It has never been tested.
   c. It is the same as a hypothesis.
   d. It has been tested many times and has been disproved.

7. Each element is made up of only one kind of _____.
   a. ion **b.** atom **c.** molecule **d.** mixture

8. The process by which a DNA molecule is copied is called _____.
   a. binary fission **b.** mitosis **c.** replication **d.** translation

9. A(n) _____ is an organism in its earliest stages of development.
   a. embryo **b.** fossil **c.** fetus **d.** allele

10. _____ is reproduction by which a single parent produces one or more identical offspring.
    a. Sexual reproduction **c.** Meiosis
    b. Conjugation **d.** Asexual reproduction

11. Many viruses are quickly destroyed by the body's _____.
    a. erythrocytes **c.** enzymes
    b. plasma **d.** leukocytes

12. Where does the gas exchange between O_2 and CO_2 occur in humans?
    a. Trachea **b.** Diaphragm **c.** Bronchioles **d.** Alveoli

13. _____ is a relationship between two species in which one benefits at the expense of the other.
    a. Commensalism **b.** Parasitism **c.** Predation **d.** Mutualism

14. Diffusion cannot occur unless there is a(n) _____.
    a. concentration gradient **c.** energy source
    b. transport protein **d.** ion

15. _____ productivity is the amount of energy taken in by photosynthesis or by consuming the bodies of other organisms.
    a. Gross **b.** Total **c.** Net **d.** Subtractive

16. Newton's first law of motion states:
    - **a.** how balanced forces affect motion.
    - **b.** how unbalanced forces affect motion.
    - **c.** why forces are always in pairs.
    - **d.** all parts and types of motion.

17. Which of the following is the correct equation for momentum?
    - **a.** An object in motion will remain in motion unless acted upon by a net force.
    - **b.** Force equals mass multiplied by acceleration.
    - **c.** To every action there is an equal and opposite reaction.
    - **d.** None of the above

18. What is the mechanical advantage of a lever that has an effort arm of 100cm and a resistance arm of 10cm?
    a. 18 **b.** 10 **c.** 15 **d.** 1000

19. Which of the following has the greatest penetrating ability?
    a. X-rays **b.** gamma rays **c.** radio waves **d.** ultraviolet rays

20. Sound is an example of _____ energy.
    a. mechanical **b.** nuclear **c.** heat **d.** electromagnetic

21. Which of the following is the equation for Work?
    - **a.** Work = force * area
    - **b.** Work = force * weight
    - **c.** Work = force * distance
    - **d.** Work = force * mass

22. A + BC $\Rightarrow$ B + AC This represents a _____ reaction.
    a. synthesis **b.** decomposition **c.** single replacement **d.** double replacement

23. In covalent bonding, electrons are
    a. gained. **b.** lost. **c.** shared. **d.** transferred.

24. A crystal is formed through _____ bonding.
    a. ionic **b.** covalent **c.** metallic **d.** nonmetallic

25. When a substance is undergoing a change in phase,
    - **a.** the temperature goes **up.**
    - **b.** the temperature goes **down.**
    - **c.** heat is either absorbed or given off but the temperature **remains** the same.
    - **d.** heat is either absorbed or given off and the temperature **changes.**

26. How many significant figures does the number 0.002014900 have?
    a. 7 **b.** 9 **c.** 5 **d.** 10

27. Food digesting in the stomach is an example of a
    - **a.** chemical property.
    - **b.** chemical change.
    - **c.** physical property.
    - **d.** physical change.

28. What is the molar mass of $(NH_4)_2CO_3$?
    a. 96 g/mol **b.** 46 g/mol **c.** 64 g/mol **d.** 82 g/mol

29. Which of the following is the formula for the compound Mercury (II) phosphate?
    a. $Mg_3(PO_4)_2$ **b.** $Mg_2(PO_4)_3$ **c.** $Hg_3(PO_4)_2$ **d.** $Hg_2(PO_4)_3$

30. Which of the following is correct about STP?
    - **a.** standard time and pressure is midnight and 1 atm
    - **b.** standard temperature and pressure is 0 K and 1 atm

c. standard time and proportion is noon and 1 mol
d. standard temperature and pressure is 0°C and 1 atm

31. How many grams are in 5.08 moles of $Ca(NO_3)_2$?
a. 752.12 g **b.** 833.12 g **c.** 3.06×10^{24}g **d.** 0.03 g

32. Arrange the following in order of increasing mass:
w. 1 molecule of I_2
x. 4.0×10^{23} molecules of C_4H_{10}
y. 6.02×10^{23} molecules of CO
z. 1 mole of P_2O_5

a. w, y, x, z **b.** y, w, z, x **c.** z, x, y, w **d.** x, y, w, z

33. The molarity of a solution in which 15.5g NaOH is dissolved in 0.100L of solution is_____?
a. 620 M **b.** 3.88 M **c.** 2.58 M **d.** 0.155 M

34. Which of the following sets of coefficients are needed to balance the equation: ___Li + ___Br_2 $\Rightarrow$ ___LiBr
a. 1,1,2 **b.** 2,0,2 **c.** 1,2,4 **d.** 2,1,2

35. Calculate the number of atoms of Zn in 3.0 moles.
a. 196.2 **b.** 0.0459 **c.** 1.81×10^{24} **d.** 4.98×10^{-24}

36. The center of gravity
a. may be located at more than one point
b. is at the geometric center of the object.
c. is a natural pivot point.
d. is the point of application of the equilibrant of parallel force vectors.

37. A car is started from rest with a constant acceleration of 4.0 feet per second per second. The distance covered during the 5^{th} second is:
a. 16 ft **b.** 20 ft **c.** 18 ft **d.** 32 ft

38. Two vectors having magnitudes of 5 and 8 that act on a single point cannot have a resultant with a magnitude of _____
a. 3 **b.** 13 **c.** 7 **d.** 15

39. Polarized light can be detected:
a. by its color.
b. by passing it through a glass prism.
c. by its intensity.
d. by passing it through a polarized filter.

40. The number of significant figures in 2804m is ___.
a. 2 **b.** 4 **c.** 3 **d.** 5

41. A graduated cylinder contains 50 cm^3 of water. When a 50-g object is completely submerged in it, the water level rises to 70 cm^3. The density of the object is:
a. $1\ ^{g}/_{cm^3}$ **b.** $0.7\ ^{g}/_{cm^3}$ **c.** $2.5\ ^{g}/_{m^3}$ **d.** $0.4\ ^{g}/_{cm^3}$

42. A baseball, mass 0.14 kg, is thrown with a velocity of 40 m/s. Its kinetic energy is _____.
a. 2.8 J **b.** 112 J **c.** 5.6 J **d.** 224 J

43. All the following phenomena can be explained if light is a wave EXCEPT:
a. reflection. **b.** photoelectric effect. **c.** refraction. **d.** diffraction.

44. A current of 5 amperes is flowing through a 10 ohm resistor. The voltage drop across this resistor is:
a. $^{1}/_{2}$ volts. **b.** 15 volts. **c.** 2 volts. **d.** 50 volts.

45. The relationship between the pressure and volume of an ideal gas when temperature is held constant is:
a. logarithmic. **b.** inverse. **c.** geometric. **d.** direct.

46. Which branch of science deals with the purposes of body parts and how they work?
a. anatomy **b.** physiology **c.** medical terminology **d.** history of science

47. All of these traits characterize all living things except which one?
a. circulation **b.** digestion **c.** growth **d.** photosynthesis

48. The _____ bone is a butterfly-shaped bone located at the inside base of the skull.
a. frontal **b.** sphenoid **c.** ethmoid **d.** parietal

49. Vertebrae that are attached to the ribs are the _____ vertebrae.
a. cervical **b.** thoracic **c.** lumbar **d.** sacral

50. Which type of tissue protects, absorbs, secretes, and excretes?
a. connective tissue **b.** muscle tissue **c.** epithelial tissue **d.** nervous tissue

End of Test

Answer Key

1. A
2. A
3. D
4. C
5. A
6. A
7. B
8. C
9. A
10. D
11. D
12. D
13. B
14. A
15. A
16. A
17. A
18. B
19. B
20. A
21. C
22. C
23. C
24. A
25. C
26. A
27. B
28. A
29. C
30. D
31. B
32. C
33. B
34. D
35. C
36. B
37. C
38. D
39. D
40. B
41. B
42. B
43. D
44. D
45. B
46. B
47. D
48. B
49. B
50. C