T M S C A M I D D L E S C H O O L

S C I E N C E

T E S T # 1 ©

O C T OB E R 2 1, 2 0 1 7

GENERAL DIRECTIONS

1. About this test:
   A. You will be given 40 minutes to take this test.
   B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are necessary for accurate grading.
3. If using a Scantron answer form, be sure to correctly denote the number of problems not attempted.
4. You may write anywhere on the test itself. You must write only answers on the answer sheet.
5. You may use additional scratch paper provided by the contest director.
6. All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
7. On the back of this page is a copy of the periodic table of the elements as well as a list of some potentially useful information in answering the questions.
8. A simple scientific calculator with the following formulas is sufficient for the science contest: +, -, %, ^, log x, e^x, lnx, y^x, sin x, $\sin^{-x}$, cos x, $\cos^{-x}$, tan x, $\tan^{-x}$, with scientific notation and degree/radian capability.
   The calculator must be silent, hand-held and battery operated. The calculator cannot be a computer or cannot have built-in or stored functionality that provides scientific information and cannot have communication capability. If the calculator has memory, it must be cleared. Each student may bring one spare calculator. **NO GRAPHING CALCULATORS ARE PERMITTED.**
9. All answers within ± 5% will be considered correct.
10. All problems answered correctly are worth **FIVE** points. **TWO** points will be deducted for all problems answered incorrectly. No points will be added or subtracted for problems not answered.
11. In case of ties, percent accuracy will be used as a tie breaker.

Periodic Table of the Elements

1A 1												3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
1 H 1.01	2A 2																2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	3B 3	4B 4	5B 5	6B 6	7B 7	8	8B 9	10	1B 11	2B 12	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 La 138.9	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.20	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (281)	111 Rg (281)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (289)	116 Lv (293)	117 Ts (293)	118 Og (294)

58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

OTHER USEFUL INFORMATION

Acceleration of gravity at Earth's surface, g = 9.81 m/s^2
Avogadro's Number, N = 6.02 x 10^{23} molecules/mole
Planck's constant, h = 6.63 x 10^{-34} J•s
Planck's reduced constant, $\hbar = h/2\pi$ = 1.05 X 10^{-34} J•s
Standard temperature and pressure (STP) is 0°C and I atmosphere
Gram molecular volume al STP = 22.4 liters
Velocity of light, c = 3.0 x 10^8 m/sec
Absolute zero= 0 K = -273.15°C
Gas constant, R = 1.986 col/K•mole = 0.082 liter•otm/K•mole
One Faraday= 96,500 coulombs (9 .65 x 10^4 C)
Dulong and Pelil's constant= 6.0 amu•cal/gram•K
Electron rest mass, m_e = 9.11 x 10^{-31} kg
Atomic mass unit, m_u = 1.66 x 10^{-21} kg
Boltzmann constant, k_B = 1.38 x 10^{-23} J/K
Permittivity of free space ε_0 = 8.85 x 10^{-12} C^2/N•m^2
Permeability of free space $\mu_0 = 4\pi$ x 10^{-7} T •m/A
1 Atmosphere= 1.02 x 10^5 N/m^2 = 760 Torr = 760 mmHg
1 Electron Volt - 1.6 x 10^{-19} Joules
Charge of on electron"' -1.6 x 10^{-19} coulombs (C)
1 horsepower (hp) = 746 W = 550 ft•lb/s
Neutron Moss= 1.008665 au
Proton Mass= 1.007277 au
1 au= 931.5 MeV
1 calorie= 4.184 Joules (J)
Specific heal of water= 4.18 J/g• °C

2017-2018 TMSCA Middle School Science Test #1

1. Filaments known as rhizoids extend from bread mold penetrating the bread and digesting the bread by secreting a substance known as

A) enzymes. **B)** hormones. **C)** vitamins. **D)** substrates.

2. The tendency of an organism to maintain a stable internal environment is called

A) homeostasis. **B)** cell theory. **C)** reproduction. **D)** evolution.

3. Which system is responsible for transporting hormones from endocrine glands to various body tissues?

A) nervous **B)** excretory **C)** digestive **D)** circulatory

4. What blood vessel is responsible for moving oxygen-rich blood from the heart to the rest of the body?

A) arteries **B)** xylem **C)** veins **D)** capillaries

5. Which of the following organs is responsible for regulating your metabolism?

A) heart **B)** thyroid **C)** thymus **D)** liver

6. What is it called when a solid turns directly into a gas?

A) deposition **B)** freezing **C)** melting **D)** sublimation

7. Neon lights are created from what chemical group?

A) noble gases **B)** halogens **C)** metalloids **D)** alkali metals

8. The prefix *melano-* used in science to form words such as melanocyte means?

A) plant **B)** male **C)** milk **D)** dark pigment

9. The suffix *–phyll* used in science to form words such as mesophyll means?

A) middle **B)** cell **C)** leaf **D)** color

10. When atoms share electrons equally they have formed a(n)

A) covalent bond. **B)** ionic bond. **C)** polar bond. **D)** hydrophobic interaction.

11. Human blood is considered which of the following

A) a solution. **B)** a suspension. **C)** a compound. **D)** none of the above.

12. Organisms that have the ability to reproduce with asexual reproduction might include which of the following?

A) hydra **B)** mites **C)** scorpions **D)** flies

13. The volume of a balloon would best be measured in?

A) cm^3 **B)** m^2 **C)** kg **D)** m

14. The lowest frequency on the electromagnetic spectrum is the

A) radio waves. **B)** microwaves. **C)** gamma rays. **D)** ultraviolet.

15. The highest frequency on the electromagnetic spectrum is the
A) radio waves. **B)** ultraviolet. **C)** gamma rays. **D)** visible light.

16. Which type of seismic wave can pass through solid, liquids, and gases?
A) Surface waves **B)** S waves **C)** P waves **D)** Q waves

17. When calculating the absolute temperature of a volume of gas you would use what unit of measurement?
A) mL **B)** °C **C)** K **D)** g

18. Which of the following planets is considered a terrestrial planet?
A) Jupiter **B)** Neptune **C)** Mercury **D)** Saturn

19. Which of the following is not part of your immune system?
A) leukocytes **B)** macrophages **C)** T cells **D)** erythrocytes

20. The final community formed after a secondary succession is called a(n)
A) biotic. **B)** habitat. **C)** niche. **D)** climax.

21. The function of the _____ is to regulate your temperature.
A) hypothalamus **B)** thymus **C)** heart **D)** gall bladder

22. If potassium has an atomic number of 19 and mass number of 39, how many protons does it have?
A) 20 **B)** 19 **C)** 39 **D)** 58

23. According to the periodic table, lithium has how many protons?
A) 3 **B)** 7 **C)** 4 **D)** 10

24. According to the periodic table, phosphorous has how many neutrons?
A) 15 **B)** 20 **C)** 30 **D)** 45

25. Prokaryotic cells contain:
A) a cell wall. **B)** a cell membrane. **C)** ribosomes. **D)** all of the above

26. Which of the following represents a salt?
A) $MgCl_2$ **B)** CO_2 **C)** H_2SO_4 **D)** Zn

27. When a variable is being testing during a scientific experiment this is referred to as the _____.
A) dependent variable **B)** independent variable **C)** constant **D)** control group

28. All of the following describe longitude except
A) Degree distance east and west
B) Western and Eastern hemispheres
C) Prime meridian
D) Equator

29. The Earth's continents are continuously moving due to plate tectonics and they will split where they first collide. This is called

A) a fault line. **B)** a convergent plate. **C)** a divergent plate. **D)** a volcanic arc.

30. If you are consuming a potato, what part of the plant are you eating?

A) the fruit **B)** the leaf **C)** the stem **D)** the root

31. Blood coming back from the body enters the heart in what structure?

A) left atrium **B)** left ventricle **C)** right ventricle **D)** right atrium

32. Blood returning from the lungs will enter through what structure?

A) left atrium **B)** right ventricle **C)** left ventricle **D)** right atrium

33. Toxins that build up in the tissues of organisms and increase in concentration up the food chain go through a process known as

A) succession. **B)** toxicology. **C)** productivity. **D)** biomagnification.

34. Mitosis is a form of asexual reproduction that is found to occur in what type of cells?

A) somatic cells **B)** sex cells **C)** gametes **D)** egg and sperm

35. What macromolecule provides the most amount of ATP energy?

A) carbohydrates **B)** lipids **C)** proteins **D)** nucleic acids

36. Plant growth that has occurred after a forest fire would be referred to as?

A) primary succession **B)** secondary succession **C)** eutrophication **D)** carrying capacity

37. The keratin that makes up your nails and hair is made from what biomolecule?

A) lipids **B)** carbohydrates **C)** fatty acids **D)** proteins

38. What organelle is responsible for maintaining the internal environment of the cell by digesting worn out cell parts and invaders?

A) ribosomes **B)** chloroplasts **C)** peroxisomes **D)** lysosomes

39. The use of a pulley system will help increase the

A) friction. **B)** exerted force. **C)** mechanical advantage. **D)** inertia.

40. When an atom loses an electron it is referred to as?

A) a cation. **B)** an anion. **C)** an isotope. **D)** a covalent atom.

41. If you want your liquid measurements taken in a lab to be more precise you would want to use a(n)

A) beaker. **B)** pipette. **C)** graduated cylinder. **D)** funnel.

42. Density takes into account what characteristics of an object?
A) mass and volume **C)** height and volume
B) volume and weight **D)** surface area and mass

43. The prefix *eco-* used in science to form words such as ecosystem means?
A) house **B)** fire **C)** birth **D)** true

44. Which of the following illnesses is caused by a virus?
A) ringworm **B)** lyme disease **C)** tonsillitis **D)** cold sores

45. When Mendel studied the pea plants and observed yellow and green seeds, what best describes his observation?
A) genotype **B)** selective breeding **C)** phenotype **D)** lysogenic

46. Which of the following is not considered to be biotic?
A) soil organisms **B)** ph **C)** algae **D)** lichens

47. The number of atoms in the reactants of a chemical reaction must equal the number of atoms in the products. This describes what scientific understanding?
A) Law of Conservation of Mass **C)** Coulombs law
B) Law of Conservation of Energy **D)** Aufbau's rule

48. Elements found in the center of the periodic table such as, Cobalt, are known as
A) metalloids. **B)** nonmetals. **C)** alkali metals. **D)** transition metals.

49. For an object to come to a stop it must be
A) acted on by a balanced force. **C)** able to overcome friction.
B) acted on by an unbalanced force. **D)** none of the above.

50. Which of the following organisms does not have a cell wall?
A) bacteria **B)** fungi **C)** hydra **D)** algae

2017-2018 TMSCA Middle School Science Test 1

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