TMSCA MIDDLE SCHOOL

SCIENCE

TEST #5 ©

NOVEMBER 18, 2017

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.

© TMSCA 2017

Periodic Table of the Elements

1A 1																	8A 18
1 H 1.01	2A 2											3A 13	4A 14	5A 15	6A 16	7A 17	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	8B 8	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, $N = 6.02 \times 10^{23}$ molecules/mole

Planck's constant, $h = 6.63 \times 10^{-34}$ J•s

Planck's reduced constant, $\hbar = h/2\pi = 1.05 \times 10^{-34}$ J•s

Standard temperature and pressure (STP) is 0°C and I atmosphere

Gram molecular volume al STP = 22.4 liters

Velocity of light, $c = 3.0 \times 10^8$ 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 $\times 10^4$ C)

Dulong and Pelil's constant= 6.0 amu•cal/gram•K

Electron rest mass, $m_e = 9.11 \times 10^{-31}$ kg

Atomic mass unit, $m_u = 1.66 \times 10^{-21}$ kg

Boltzmann constant, $k_B = 1.38 \times 10^{-23}$ J/K

Permittivity of free space $\varepsilon_0 = 8.85 \times 10^{-12}$ C^2/N•m^2

Permeability of free space $\mu_0 = 4\pi \times 10^{-7}$ T •m/A

1 Atmosphere= 1.02×10^5 N/m^2 = 760 Torr = 760 mmHg

1 Electron Volt - 1.6×10^{-19} Joules

Charge of on electron"' -1.6×10^{-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

1. A compound that is classified as organic must contain what element?
   A) oxygen　　　　　　**B)** hydrogen　　　　　　**C)** calcium　　　　　　**D)** carbon

2. The normal boiling point of water is equal to
   A) 0°C　　　　　　**B)** 212°C　　　　　　**C)** 273 K　　　　　　**D)** 373 K

3. Identify which of the following is not an example of a physical property?
   A) density　　　　　　**B)** mass　　　　　　**C)** malleable　　　　　　**D)** combustible

4. Which of the following elements has a 6 valence electrons
   A) Ra　　　　　　**B)** Se　　　　　　**C)** Xe　　　　　　**D)** Mg

5. Scientists use which of the following to measure mass?
   A) pound　　　　　　**B)** ounce　　　　　　**C)** meter　　　　　　**D)** kilogram

6. An antibiotic can be used to kill all of the following except:
   A) cold virus　　　　　　　　　　**C)** *Streptococcus pyogenes*
   B) *Bacillus anthracis*　　　　　　**D)** staph infection

7. The common passage for both air and food directly after the mouth is called the
   A) esophagus.　　　　　　**B)** trachea.　　　　　　**C)** pharynx.　　　　　　**D)** larynx.

8. An instrument that measures blood pressure is known as a(n)
   A) anemometer.　　　　　　　　　　**C)** odometer.
   B) barometer.　　　　　　　　　　　**D)** sphygmomanometer.

9. The Actinide series is part of what period on the Periodic Table?
   A) 7　　　　　　**B)** 3　　　　　　**C)** 5　　　　　　**D)** 6

10. A person with blood type A can donate blood to individuals with what blood types?
   A) AB, A, and O　　　　　　　　　**C)** AB and A only
   B) A, B, and O　　　　　　　　　　**D)** A only

11. The prefix *hepa-* used in science to form words such as hepatitis means?
   A) ill　　　　　　**B)** inflammation　　　　　　**C)** female　　　　　　**D)** liver

12. Grass would be considered a monocot which means it has
   A) one seed coat.　　　　　　　　　**C)** two embryos.
   B) one cotyledon.　　　　　　　　　**D)** doesn't flower.

13. Which of the following would not be considered a microorganism?
   A) amoeba　　　　　　**B)** hydra　　　　　　**C)** water strider　　　　　　**D)** plankton

14. _____ is the measurement of the force that gravity exerts on an object.
   A) mass　　　　　　**B)** weight　　　　　　**C)** acceleration　　　　　　**D)** friction

15. Which particle in an atom does not add to the mass of the atom?
A) proton   **C)** neutron
B) electron   **D)** all of them add to the mass of the atom

16. Which of the following would be considered a solution?
A) salt water   **B)** oil and vinegar   **C)** salt and pepper in   **D)** human blood
                                                                          oil

17. Elements in the same horizontal row belong to the same
A) period.   **B)** family.   **C)** group.   **D)** pattern.

18. What would not be found as part of a bacterial cell?
A) nucleolus   **B)** ribosomes   **C)** cytoplasm   **D)** cell membrane

19. _____ are different forms of the same gene.
A) clones   **B)** alleles   **C)** genotypes   **D)** chromosomes

20. The _____ is the largest region of the brain.
A) cerebellum   **B)** medulla oblongata   **C)** cerebrum   **D)** pons

21. Organisms that are known to feed on the blood of others are best referred to as
A) parasites.   **B)** herbivores.   **C)** carnivores.   **D)** omnivores.

22. Types of sedimentary rock would include the following except:
A) sandstone   **B)** limestone   **C)** shale   **D)** slate

23. In vascular plants, water moves from the root system to the shoot system by the _____.
A) xylem   **B)** phloem   **C)** vacuole   **D)** stomata

24. Rod-shaped bacteria are called
A) coccus.   **B)** spirilla.   **C)** bacilli.   **D)** strepto.

25. The bottom zone of the ocean would be called the
A) littoral.   **B)** photic.   **C)** aphotic.   **D)** benthic.

26. A genotype such as, Bb, represents the two different _____ found in an organism.
A) genes   **B)** alleles   **C)** chromosomes   **D)** DNA

27. Animal-like protists would include all of the following except:
A) dinoflagellates.   **B)** paramecium.   **C)** zooflagellates.   **D)** amoeba.

28. A moss is not able to grow tall like a tree primarily because of its lack of a
A) root system.   **B)** photosynthetic   **C)** vascular system.   **D)** none of the above.
                                     structures.

29. The sides of the DNA ladder are made up of
   A) sugars and phosphates.
   B) sugars and bases.
   C) phosphates and bases.
   D) bases, phosphates, and sugars.

30. The female reproductive organ on a flowering plant is called a(n)
   A) pistil.　　　　**B)** filament.　　　　**C)** seed.　　　　**D)** cotyledon.

31. How many kilograms are there in 6.12 pounds? (2.2 lbs= 1 kg)
   A) 1.36　　　　**B)** 3.59　　　　**C)** 13.46　　　　**D)** 2.78

32. The top layer of the continental crust is called the
   A) asthenosphere.　　　　**B)** lithosphere.　　　　**C)** chromosphere.　　　　**D)** ionosphere.

33. Multiple sclerosis is a degenerative disease that attacks what biological system?
   A) epithelial　　　　**B)** nervous　　　　**C)** circulatory　　　　**D)** skeletal

34. If two heterozygous individuals for a particular trait were to mate, how many offspring would have a recessive phenotype?
   A) 100%　　　　**B)** 50%　　　　**C)** 25%　　　　**D)** 75%

35. The waxy, protective layer on leaves is the
   A) guard cells.　　　　**B)** stomata.　　　　**C)** cuticle.　　　　**D)** chlorophyll.

36. The tiny hairs on the leaves and stems of plants may aide in insect pollination are called
   A) root hairs.　　　　**B)** trichomes.　　　　**C)** cuticles.　　　　**D)** rhizomes.

37. During mitosis, chromosomes line up in the middle of the cell in _____.
   A) prophase　　　　**B)** metaphase　　　　**C)** anaphase　　　　**D)** telophase

38. The fibers that join bone to bone are
   A) cartilage.　　　　**B)** tendons.　　　　**C)** ligaments.　　　　**D)** marrow

39. Iodine is a chemical indicator used to identify _____.
   A) sugars　　　　**B)** proteins　　　　**C)** lipids　　　　**D)** starches

40. When a gas directly forms into a solid this is called?
   A) sublimation　　　　**B)** freezing point　　　　**C)** equilibrium　　　　**D)** deposition

41. How many different nucleotide bases are present in DNA?
   A) 2　　　　**B)** 4　　　　**C)** 5　　　　**D)** 6

42. The longest wavelength found on the electromagnetic spectrum is the
   A) radio waves.　　　　**B)** microwaves.　　　　**C)** gamma rays.　　　　**D)** visible light.

43. The three types of seismic waves of an earthquake are?
 A) Q, R, and S waves   **C)** P, Surface, and T   **D)** P, Surface, and S
 B) P, S, and T waves   waves   waves

44. Which of the following planets can not been seen with the naked eye?
 A) Venus   **B)** Neptune   **C)** Jupiter   **D)** Saturn

45. The fifth planet from the Sun is
 A) Neptune.   **B)** Mars.   **C)** Jupiter.   **D)** Saturn.

46. Which of the following is part of your immune system?
 A) B cells   **B)** platelets   **C)** astrocytes   **D)** erythrocytes

47. The function of the _____ is to produce hormones to regulate your blood sugar.
 A) liver   **B)** small intestine   **C)** adrenaline   **D)** pancreas
                                                                     glands

48. An apple hanging from a tree limb has
 A) kinetic energy.   **B)** friction.   **C)** chemical energy.   **D)** potential energy.

49. If nitrogen has 7 neutrons and a mass number of 14, how many electrons does it have?
 A) 14   **B)** 6   **C)** 7   **D)** 8

50. The particles found in a _____ move independently from each other.
 A) liquid   **B)** gas   **C)** solid   **D)** all of the above

2017-2018 TMSCA Middle School Science Test 5

1. D
2. D
3. D
4. B
5. D
6. A
7. C
8. D
9. A
10. C
11. D
12. B
13. C
14. B
15. B
16. A
17. A

18. A
19. B
20. C
21. A
22. D
23. A
24. C
25. D
26. B
27. A
28. C
29. A
30. A
31. D
32. B
33. B
34. C

35. C
36. B
37. B
38. C
39. D
40. D
41. B
42. A
43. D
44. B
45. C
46. A
47. D
48. D
49. C
50. B