TMSCA MIDDLE SCHOOL SCIENCE TEST#3 ©

NOVEMBER 3, 2012

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 Acomputer@, 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							8B										8A
1 H 1.008	2A										1B	2B	3A	4A	5A	6A	7A	2 He 4.003
3 Li 6.941	4 Be 9.012												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 23.00	12 Mg 24.31	3B	4B	5B	6B	7B							13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	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 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Ha (262)	106 Unh (263)	107 Uns (262)		109 Une (267)										

Lanthanides	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
Actinides	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	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 (260)

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 1 atmosphere

Gram molecular volume at 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 cal/K•mole = 0.082 liter•atm/K•mole

One Faraday = 96,500 coulombs (9.65×10^4 C)

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

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

Atomic mass unit, $m_u = 1.66 \times 10^{-27}$ kg

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

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

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

1 Atmosphere = $1.02 \times 10^5\ N/m^2$ = 760 Torr = 760 mmHg

1 Electron Volt = 1.6×10^{-19} Joules

Charge of an electron = -1.6×10^{-19} coulombs (C)

1 horsepower (hp) = 746 W = 550 ft•lb/s

Neutron Mass = 1.008665 au

Proton Mass = 1.007277 au

1 au = 931.5 MeV

1 calorie = 4.184 Joules (J)

Specific heat of water = 4.18 J/g•°C

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1. Different forms of the same gene are called _____.
   A. proteins B. traits C. alleles D. characteristics

2. A _____ has a definite ratio of components.
   A. solution B. colloid C. suspension D. compound

3. ___ lava is so thick in consistency that it barely creeps along the ground.
   A. Pahoehoe B. Aa C. Blocky D. Pillow

4. The organ system that provides support and protection for body parts is the _____ system.
   A. endocrine B. circulatory C. skeletal D. respiratory

5. A ____ is the region of land drained by a river system.
   A. divide B. watershed C. channel D. load

6. The unit for power is the _____.
   A. Newton B. kilogram C. watt D. Joule

7. Strike-slip faults are prominent along _____ plate boundaries.
   A. convergent B. transform C. separating D. divergent

8. What features are common in youthful river channels?
   A. meanders B. flood plains C. rapids D. sandbars

9. Nuclear power plants use a process called ____ to produce energy.
   A. fission B. fusion C. fracking D. none of these

10. Water _____ would most affect an ocean's salinity.
    A. mass B. volume C. pressure D. movement

11. DNA is made of four parts called _____.
    A. nucleotides B. genes C. alleles D. traits

12. A suspension is a _____.
    A. soluble substance C. heterogeneous mixture
    B. homogeneous mixture D. solute dissolved in a solvent

13. A _____ volcano has a steep slope and a broad base.
    A. cinder cone B. shield C. composite D. both a & b

14. ____ allow bones in the hand to glide over one another, giving some flexibility to the area.
    A. Hinge joints C. Sliding
    B. Ball-and-socket joints D. Rolling

15. Complex carbohydrate made by the human body are stored in the _____.
A. kidneys B. pancreas C. spleen D. liver

16. Compound eyes are found on _____.
A. plants B. flat worms C. humans D. insects

17. Which factor does not increase the speed at which a solid solute dissolves in water?
A. stirring or shaking the mixture C. adding more solute
B. heating the mixture D. crushing the solute

18. What type of tectonic plate boundary involves a collision between two tectonic plates?
A. divergent B. transform C. convergent D. normal

19. Cells do not use _____ for energy storage.
A. fats B. oils C. carbohydrates D. nucleic acids

20. Most of the salt in ocean water is _____ chloride.
A. sodium B. magnesium C. potassium D. calcium

21. Which of the following is thought to contribute to global warming?
A. wind patterns C. ocean surface currents
B. deforestation D. plate tectonics

22. The amount of air resistance acting on an object depends on the object's _____.
A. size and shape C. color and salinity
B. color and width D. malleability and density

23. Bowl-like depressions that form where alpine glacial ice cuts back into the mountain walls are called _____.
A. cirques C. U-shaped valleys
B. arêtes D. hanging valleys

24. ____ is a force that is not directly opposite pushing against a solid from different sides resulting in tearing and twisting.
A. Tension B. Transfoming C. Covergents D. Shearing

25. Ninety percent of all photosynthesis is carried on by _____.
A. green plants B. algae C. animals D. fungi

26. The _____ of the cell gobble up waste materials.
A. nucleus B. vacuole C. ER D. lysosomes

27. Chromosomes are organized structures of _____.
A. ATP B. DNA C. organelles D. lipids

28. A line on an air pressure map which atmospheric pressure is the same is called a/an _____.
A. high B. front C. isobar D. low

29. An iron skillet can cook foods on a stove because it has high thermal _____.
A. conductivity B. malleability C. ductility D. reflectivity

30. About 245 million year ago, the continents were one landmass called _____.
A. Laurasia B. Pangaea C. Panthalassa D. Gondwanna

31. What factor affects the prevailing winds as they blow across a continent and produce different climates?
A. latitude B. mountains C. forests D. glaciers

32. Which of the following is a product of photosynthesis?
A. glucose B. carbon dioxide C. water D. thermal energy

33. _____ ,in the early 1800's, developed the first electric generator and electric motor.
A. Thomas Edison C. Benjamin Franklin
B. Michael Faraday D. Henry Ford

34. Organisms grow through the process called cell _____.
A. multiplication B. division C. addition D. subtraction

35. A _____ is a very small organism with a simple cell structure with no nucleus.
A. bacterium B. chlorophyll C. parasite D. virus

36. A group of single-celled, animal-like protists are _____.
A. mycelium B. protozoa C. pseudopods D. spores

37. An organism that can spread a disease without showing symptoms of the disease is called _____.
A. cancer B. a toxin C. a carrier D. pasturized

38. The reproductive organs of angiosperms are _____.
A. flowers B. fronds C. ginkgos D. monocots

39. A ripened plant ovary that contains the seeds is _____.
A. the cuticle B. fruit C. embryo D. xylem

40. A/An _____ is a large clump of ice, dust, and frozen gases that travels around the Sun in a long orbit.
A. planetoid B. meteoroid C. asteroid D. comet

41. Which of the following is a protein?
A. glycerol B. trypsin C. cholesterol D. tyrosine

42. Occasionally, solar flares excite gases in the upper atmosphere of Earth, causing them to radiate some spectacular displays of colored lights in the night sky called _____.
A. prominences B. convections C. auroras D. coronas

43. _____ is/are deposits of unsorted and unstratified sediments deposited by the movement of a glacier.
A. Till B. Loess C. Varve D. Glacial milk

44. The _____ states that systems behave unpredictably and randomly even though they clearly appear to be governed by well-understood laws of physics.
A. Chaos Theory C. Heliocentric Theory
B. Cell Theory D. Quark Theory

45. The function of the cell ribosomes is to _____.
A.build proteins C. contain instructions
B. store fluids D. release energy

46. The field of _____ studies cancer.
A. oncology B. ornithology C. cytology D. cryogenics

47. Which of the following cellular structures are found in plant cells and not in bacteria?
A. mitochondria B. chloroplasts C. cell membranes D. ribosomes

48. An ionic state of an atom of hydrogen would have how many protons?
A. 1 B. 2 C. 3 D. 4

49. The greatest geophysical impacts from the movement of Earth's lithospheric plates are most often seen and felt ____?
A. at the center of the plates C. along riverbeds within the plates
B. at plate boundaries D. evenly distributed throughout the plate

50. Consider a star observed just above the horizon in the western sky at dusk. It would most likely have been _____ at sunrise that day.
A. in the same position C. high in the southern sky
B. high in the western sky D. just above the horizon in the eastern sky

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Answer Key

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