TMSCA MIDDLE SCHOOL SCIENCE TEST # 6 ©

DECEMBER 3, 2011

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 forrmulas 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", 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												3A	4A	5A	6A	7A	8A
1 H 1.008	2A						8B			1B	2B						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				1B	2B	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, $m_a = 1.66 \times 10^{-27}$ 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. The study of the changes of the Earth that occurs both within and on Earth is called _____.
   A. astronomy B. microbiology C. geology D. botany

2. Genera that have similarities and relationships among the same group are called a(n) ____.
   A. species B. family C. class D. order

3. Which part of the plant has root hairs which act like straws?
   A. root cap B. epidermis C. stems D. leaves

4. ____ are volcanic formations that rise at least 1000 meters above the ocean floor, but do not rise above sea level.
   A. Ridges B. Seamounts C. Guyots D. Trenches

5. _____ causes ocean water to be more salty.
   A. Evaporation B. Precipitation C. Raining D. Volcanoes

6. The _____ in the ocean water determines how the gases dissolve.
   A. animal life B. water temperature C. carbon dioxide D. salinity

7. The blood picks up waste from the body cells in the _____.
   A. arteries B. veins C. capillaries D. aorta

8. The process of forming new cells is called _____.
   A. celluitius B. gametes C. mitoesitch D. mitosis

9. Newton's____ Law of Motion explains F=m x a.
   A. First B. Second C. Third D. Fourth

10. On the Celsius scale, the point where water turns to water vapor is ____ degrees C.
    A. 12 B. 0 C. 100 D. 212

11. When we say that cell is specialized, we mean that it has a special _____.
    A. name B. chemical C. function D. organ

12. Abiotic refers to components such as _____.
    A. sunlight, carbon dioxide, and producers
    B. sunlight, weather, altitude, and decomposers
    C. sunlight, minerals, and consumers
    D. sunlight, water, minerals and weather

13. A particle that is not a cell but can reproduce in the cell of a living organism is a/an _____.
    A. bacterium B. virus C. parasite D. saprophyte

14. Adult amphibians must live in a moist environment primarily to _____.
A. carry out internal fertilization C. Keep their gills damp
B. keep their skins from drying out D. ensure body wastes are removed

15. An organism that obtains its food from breaking down dead and decaying organism is a/an _____.
A. ameba B. algae C. decomposer D. flagellate

16. The scientist associated with antibiotics is _____.
A. Fleming B. Jenner C. Lister D. Pasteur

17. All of the following are epithelial tissues except the _____.
A. covering of the lungs C. lining of the throat
B. outer portion of the skin D. fluid that surrounds cells

18. The category of plants called _____ includes all our food crops.
A. gymnosperms B. angiosperms C. fronds D. rhizoids

19. Positive geotropism is shown by the _____ of the plant.
A. flower B. leaves C. stems D. roots

20. Which of the following is from the phylum Coelenterata?
A. coral B. earthworm C. frog D. lobster

21. The final, balanced stage of a community at the end of a succession is called a/an _____.
A. secondary community C. climax community
B. animal succession D. population crash

22. The growing season is 9 to12 months long in a _____.
A. coniferous forest C. temperate zone
B. tropical rain forest D. tundra biome

23. The hot, wet climate of the ____ produces the greatest variety of life on Earth.
A. tropical rain forest C. temperate rain forest
B. tundra D. taiga

24. The level in the classification system that is broader than species but narrower than family is _____.
A. class B. order C. genus D. phylum

25. The first 25 cm of the small intestine is the _____.
A. epiglottis B. duodenum C. esophagus D. large intestine

26. Plasma proteins that fight disease are called _____.
A. antibodies B. aorta C. arteries D. atria

27. The _____ is the largest gland in the human body.
A. kidney B. liver C. bladder D. heart

28. An involuntary action that occurs in response to a stimulus is called a/an _____.
A. reflex B. impulse C. feedback D. retina

29. A network of overlapping food chains is called a _____.
A. food web B. food pyramid C. habitat D. food cycle

30. The substances listed on the left side of a chemical equation are the _____.
A. products B. coefficients C. precipitates D. reactants

31. Water freezes at 32° on which temperature scale?
A. Fahrenheit B. Celsius C. Kelvin D. absolute zero

32. The material through which a wave travels is called a _____.
A. vibration B. medium C. crest D. trough

33. The ozone layer is located _____.
A. close to Earth's surface C. in the upper atmosphere
B. in the lower atmosphere D. in outer space

34. The climate zones lying between 23.5° and 66.5° north and south latitudes are called the _____ zones.
A. temperate B. polar C. tropical D. subtropical

35. At least four major ice ages have occurred on Earth during the past _____ years.
A. 10,000 B. 200,000 C. 2 million D. 4 million

36. How many chloride ions are needed to cancel the 2+ charge of magnesium in magnesium chloride ($MgCl_2$)?
A. 1 B. 2 C. 3 D. 4

37. A spring tide can only happen at _____.
A. new moon B. first quarter C. third quarter D. first quarter

38. A machine that uses two or more simple machines is called a _____ machine.
A. combination B. compound C. mechanical D. mixed

39. When the rock of a sea cave is eroded through, a sea _____ forms.
A. cliff B. stack C. arch D. wall

40. Water sheds that supply runoff to different drainage systems are usually separated by a ridge of land called a/an _____.
A. tributary B. aquifer C. geyser D. divide

41. In which layer listed will air pressure be greatest?
A. exosphere B. mesosphere C. stratosphere D. thermosphere

42. When water vapor in the air turns directly from a gas to a solid, _____ forms.
A. frost B. dew C. snow D. fog

43. When underground layers of limestone are dissolved by ground water, a/an _____ forms.
A. sinkhole B. aquifer C. artesian well D. water table

44. The ozone layer protects people from which of the following?
A. too much ultraviolet radiation C. the effects of radon
B. carbon monoide poisoning D. acid rain

45. Where does most metamorphic rock form?
A. at the surface C. in sea waters
B. just below the surface D. deep underground

46. Earth's magnetic field results from the convection currents in the _____.
A. mantle B. outer core C. inner core D. crust

47. What color are the hottest stars?
A. blue-white B. yellow C. red D. orange

48. What are the highest and lowest points on a standing wave called?
A. nodes B. antinodes C. compressions D. rarefactions

49. Minerals can form deep inside Earth's crust by _____.
A. cleavage and fracture C. crystallization of melted materials
B. friction along faults D. evaporation of ancient seas

50. What occurs when parallel rays of light hit a rough or bumpy surface?
A. regular reflection C. refraction
B. diffuse reflection D. diffraction

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Answer Key

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