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 # 8 ©

J A N U A R Y 2 3 , 2 0 2 1

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)

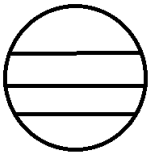
58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101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

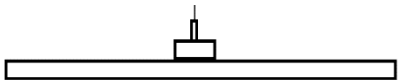
OTHER USEFUL INFORMATION

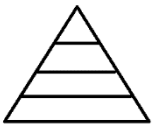
Acceleration of gravity at Earth's surface, g = 9.81 m/s^2
Avogadro's Number, N = 6.02 x 10^{23} molecules/mole
Planck's constant, h = 6.63 x 10^{-34} J•s
Planck's reduced constant, $\hbar = h/2\pi$ = 1.05 X 10^{-34} J•s
Standard temperature and pressure (STP) is 0°C and I atmosphere
Gram molecular volume 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

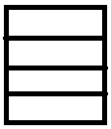
2020-2021 TMSCA Middle School Science Test #8

1. Which diagram below best displays the trophic levels and 10% rule of energy relationships, with the bottom showing producers, then primary consumers, then secondary and tertiary consumers?

A. 

B. 

C. 

D. 

2. Male Texas Horned Lizards have "femoral" pores. Where would these pores be located?

A. head
B. foot
C. back
D. thigh

3. What is the correct calculation of the concentration for a solution in which 28 g of salt is dissolved into 500 mL of water?

A. 14,000 mL/g B. 17.86 g/mL C. 472 mL/g D. 0.056 g/mL

4. What is the atomic number for Gold?

A. 79 B. 31 C. 47 D. 32

5. What is the most abundant gas found in Earth's atmosphere?

A. Oxygen B. Hydrogen C. Nitrogen D. Helium

6. In 1795, a geologist from Scotland, James Hutton, described in a book how the Earth processes that we see today are the same as those that happened in the past before we could observe these changes. This principle is known as what?

A. Superposition
B. Uniformitarianism
C. Relativism
D. Catastrophism

7. After extensive wildfires in a forest, the area seemed completely void of life. Eventually, life returned. This is an example of what type of succession?

A. primary B. secondary C. tertiary D. none of these

8. After a volcano erupted, a mudflow moved down the slope of the mountain. This destructive mudflow is called what?

A. tephra B. pahoehoe C. avalanche D. lahar

9. Being exposed to certain minerals and rocks can make a person very sick. Serpentinite is associated with a substance that was widely used in insulation until it was discovered to be a carcinogen, and is no longer used. What is the name of this substance? (banned in several countries)

A. bismuth B. labradorite C. gypsum D. asbestos

10. Which of the following shows the grain sizes in order from largest to smallest?

A. clay, sand, silt
B. clay, silt, sand
C. silt, sand, clay
D. sand, silt, clay

11. Which of these catastrophic events is sometimes caused by an earthquake?

A. tsunami B. hurricane C. tornado D. A and B

12. Look over this list below.

1. Does the sky contain clouds? a. Yes - go to #2 b. No - it is a clear day
2. Are the clouds low and do they look like puffy cotton balls? They mean fairweather. a Yes - Cumulous clouds b. No - go to#3
3. Are the clouds low, light or gray, and cover the sky like a blanket? They may bring poor weather. It can also be called fog when on the ground. a. Yes - Stratus couds b. No - go to #4
4. Are the clouds low, irregular masses, rolling and/or puffy? a. Yes - Stratocumulus clouds b. No- go to #5
5. Are the clouds low and dark gray? It may be raining. The clouds may hide the sun. a. Yes - Nimbostratus clouds. b. No - go to #6
6. Are the clouds low, large, and tall like a tower? It may be raining. It may be called a thunderstorm cloud. a. Yes - Cumulonimbus b.No - go to #7
7. Are the clouds off-white or light gray and puffy like cotton balls with spaces between them? a. Yes - Alto cumulus cllouds B. No - go to #8
8. Are the clouds off-white or light gray? They may cover the whole sky. a. Yes- Altostratus clouds b. No - go to #9
9. Are the clouds high and feathery? a. Yes- Cirrus clouds B. No - go to #10
10. Are the clouds high, thin, and light gray or white? You may be able to see the sun or the moon through them. a. Yes - Cirrostratus clouds. b. No - go to #11
11. Are the clouds high and puffy with spaces between them like waves? a. Yes - Cirrocumulus clouds.

What would be the best title for this list of steps?

A. Cloud Binomial Nomenclature
B. Cloud Dichotomous Key
C. Different Types of Cumulus Clouds
D. Cloud Types and How to find them

13. The Tropic of Capricorn is found at what?

A. 23.5^{o} S latitude
B. 23.5^{o} N latitude
C. 0^{o} latitude 0^{o} longitude
D. 30^{o} North of equator

14. What element makes up about 21% of the Earth's atmosphere?

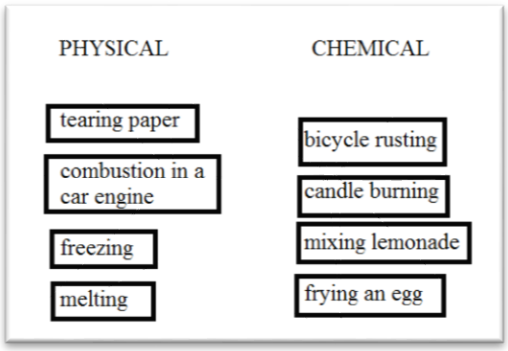
A. Oxygen B. Nitrogen C. Hydrogen D. Helium

15. A door with hinges is an example of what class of lever?
    A. first class – fulcrum is in between effort force and load force
    B. second class – load force is between the effort force and the pivot point
    C. third class – effort force is between the load force and the fulcrum
    D. none of these

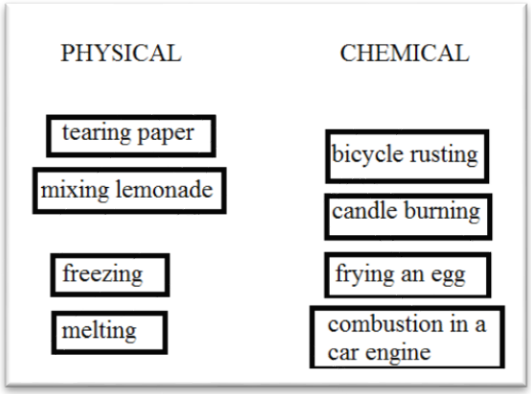
16. The word “electricity” came from the Latin word “electricus” that means what?
    A. “charged particles” because of Benjamin Franklin’s kite experiments
    B. “voting” because of the similarity of Democratic process used to determine leaders and flow of electric current
    C. “lightning” because of the phenomenon produced from thunder
    D. “like amber” most likely because early Greeks noticed if you rubbed amber, dust would magically stick to it

17. Jansen was in science lab. His group was asked to separate cards into two piles – physical and chemical changes. Which answer below would be correct for the two piles?

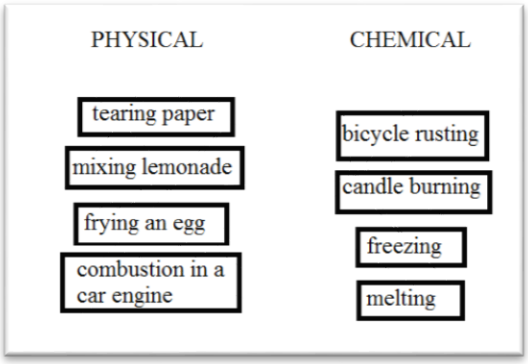
A.



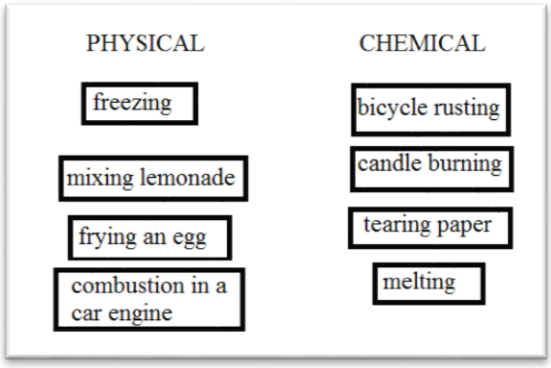
B.



C.



D.



18. What is the SI unit to measure frequency?

A. watt B. volt C. hertz D. wavelength

19. Minerva was visiting a sick friend and heard her friend's mom mention a word with "dermat" as part of it when she was talking about the friend's condition. Minerva assumed that her friend had a problem with what?

A. heart B. skin C. eyes D. toes

20. Look at the equation below. What does this show?

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy is released

A. photosynthesis B. cellular respiration C. Both A and B D. Neither A or B

21. How many protons does an atom of the element Potassium have?

A. 39 B. 19 C. 15 D. 84

22. Which statement about planet Earth is untrue?

A. Earth is the only planet with water.
B. Earth bulges a small amount at the equator.
C. Earth is about 40,000 km in circumference.
D. Earth is slightly flattened at its poles.

23. Which part of a plant moves the water and mineral nutrients from its roots through the stem to its leaves?

A. sieve tubes B. cortex C. xylem D. phloem

24. A yucca moth relies on the yucca plant to provide protection and a place to lay its eggs with food for the hatched larva. The yucca plant is pollinated by the yucca moth. This is an example of what?

A. symbiotic potential B. commensalism C. parasitism D. mutualism

25. What is considered to be the most common volcanic gas?

A. carbon dioxide B. oxygen C. water vapor D. hydrogen

26. Organelles working together make up cells, cells working together make up tissue, tissue working together make up organs, organs working together make up organ systems, and what?

A. organ systems working together make up consciousness
B. organ systems working together make up an entity
C. organ systems working together make up an organism
D. organ systems working together make up a eukaryotic being

27. The largest known volcano in our solar system is on what planet?

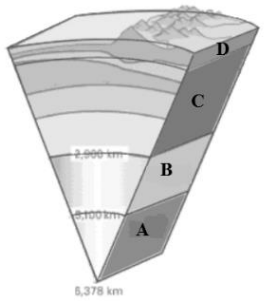
A. Venus B. Mars C. Neptune D. Earth

28. When a student was studying to become a medical doctor, he/she saw a word that ended with the suffix "algia". What word below would this suffix indicate?

A. blood B. swelling C. breathing D. pain

29. In this model of a slice of the Earth, what letter best represents the layer called the crust?

A. A
B. B
C. C
D. D



30. There is one animal that has the right genes to produce proteins that can break down the toxins found in eucalyptus plants. What animal is this?

A. pandas B. tortoises C. kangaroos D. koalas

31. What becomes a waste product(s) of cellular respiration?

A. carbon dioxide B. water C. Both A and B D. Neither A or B

32. When the numbers of bobwhite quail on the ranch were decreasing, the rancher wanted to know more about what types of predators were lowering the quail population. In order to find out, she set up a game camera to take photos of the animals that came through. She had photos of 2 bobcats, 4 coyotes, 3 jackrabbits, 8 cows, and 5 raccoons. Which answer below is true about her findings?

A. She captured photos of 14 predators of quail with the game camera.
B. She captured photos of 22 predators of quail with the game camera.
C. She captured photos of 11 predators of quail with the game camera.
D. She captured photos of 20 predators of quail with the game camera.

33. What is an allele?

A. a base for DNA
B. a genotype
C. another name for chromosome
D. one of two or more versions of a gene

34. Hepatitis C infection is connected to problems with what organ of the human body?

A. bladder B. liver C. pancreas D. heart

35. If an insect belongs to the order Trichoptera, then it may be a what?

A. mosquito B. wasp C. caddisfly D. moth

36. Mammals can be classified into subclasses by how they reproduce and the embryonic development. Which of the following mammals have their young develop over a long period of time in the female's uterus?

A. marsupials B. placental C. monotremes D. Both B and C

37. The Greek word "blastos" means what?

A. sprout B. explosion C. die D. organism

38. Which of these words describes a hollow sphere of cells that surround an inner-fluid cavity that is formed during an early embryonic stage in animals?

A. zygote B. blastula formation C. embryo D. somatic sphere

39. I discovered that electricity and magnetism were closely related in 1820 leading to electromagnetism. I was a Danish natural philosopher. Who am I?

A. Leeuwenhoek B. Watson C. Oersted D. Salk

40. When conducting science investigations, statistics is an important component. Which of the following is a statistical test that you could use to find differences between two quantitative groups of data?

A. bar graphing B. t test C. average D. simple regression

41. During an investigation, a scientist found it necessary to convert units from English to metric. If 1 cubic centimeter or mL is equal to 0.034 fluid ounces, about how many mL would 150 fluid ounces be?

A. 5.1 B. 0.034 x 150 C. 150 D. 4,412

42. Which inner planet rotates clockwise instead of counter-clockwise (in our solar system)?

A. Uranus B. Mercury C. Mars D. Venus

43. Albert had a common house fly buzzing around his head during science class. It had entered through an open window. His friend said don't worry, it will die soon because house flies only live 24 hours. Albert told his friend he thought they lived 10 days. Which person was correct?

A. Albert's friend was correct; common house flies have a 24-hour life span, reproduce and then die.

B. Albert was correct; common house flies can live only 10 days.

C. Neither was correct; common house flies have a life span of 15 to 30 days.

D. Neither was correct; common house flies live for 6 years.

44. What is the chemical symbol on the periodic table of the elements for Xenon?

A. X B. Xn C. Xe D. Zn

45. Danielle's class was learning about potential and kinetic energy. They built a miniature roller coaster for a marble. At what place on the roller coaster will the marble have the most gravitational potential energy?

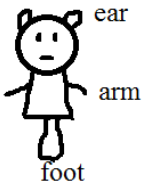
A. A
B. B
C. C
D. D

46. Which law below deals with the forces created between two charged objects?

A. Davy's law B. Newton's law C. Faraday's law D. Coulomb's law

47. Using your knowledge of Greek and Latin root words, suffixes, and prefixes, which name below would be the best name to describe this imaginary creature?

A. quadropod
B. tripod
C. bipod
D. monopod



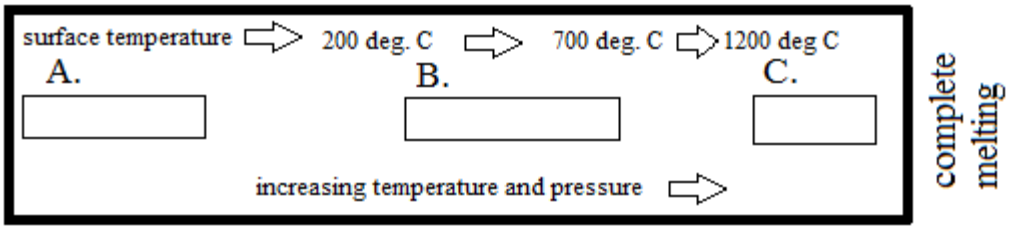
48. Which list of trees shown below are all deciduous?

A. elms, maples, grapevines
B. live oaks, pines, cypress
C. willows, spruce, redcedars
D. firs, hemlocks, junipers

49. Which plant below is a non-vascular plant?

A. liverworts B. ferns C. club mosses D. both B and C

50.



The diagram above is a chart showing the 3 different environments for rock formation. What statement below about the diagram is true?

A. Box A represents the metamorphic rock environment.
B. Box B represents the sedimentary rock environment.
C. Box C represents the igneous rock environment.
D. Both A and B are correct.

2020 - 2021 TMSCA Middle School Science Test #8 - Key

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