TMSCA MIDDLE SCHOOL SCIENCE TEST #9©

FEBRUARY 1, 2020

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

2019-2020 TMSCA Middle School Science Test #9

1. Jellyfish have interesting adaptations for survival. Which statement about jellyfish is not true?
   A. Jellyfish have no brain, bones, or mouth.
   B. Some jellyfish are bioluminescent.
   C. Jellyfish belong to the Phylum Cnidaria
   D. Some jellyfish eat and discard wastes from the same opening.

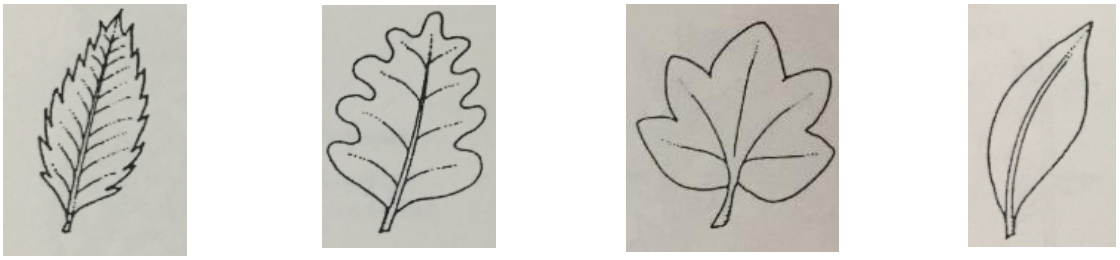
2. Which of the following would describe the opposite of the word "anterior"?
   A. back B. middle C. front D. side

3. Inherited traits include all but which of the following?
   A. eye color B. freckles C. cleft chin D. language

4. Which Ecoregion of Texas is composed of grasslands, sandy beaches, wetlands, and estuaries that host a variety of species, including the Atwater's Prairie Chicken?
   A. Pineywoods B. Blackland Prairie C. Gulf Coast Prairie D. Cross Timbers

5. Capulin in New Mexico was a volcano that erupted about 60,000 years ago and formed steep, conical sides, but is now dormant. What type of volcano is Capulin?
   A. dormant cinder cone B. shield C. composite D. not a volcano

ONE TWO THREE FOUR

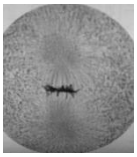


6. Look at the four drawings above. Using these drawings of leaves, answer the following. Which statement below is correct?
   A. ONE is pinnately lobed, TWO is palmately lobed, THREE is entire, FOUR is toothed
   B. ONE is toothed, TWO is pinnately lobed, THREE is palmately lobed, FOUR is entire
   C. ONE is toothed, TWO is entire, THREE is palmately lobed, FOUR is pinnately lobed
   D. ONE is entire, TWO is toothed, THREE is pinnately lobed, FOUR is palmately lobed

7. What does the prefix "cuti" mean?
   A. skin B. fingers C. touch D. hair

8. Who was the Greek philosopher who proposed that the universe is composed of four elements and what were they?
    A. Empedocles – earth, air, fire, water
    B. Aristotle – hydrogen, helium, carbon, calcium
    C. Socrates – water, air, dirt, heat
    D. Heraclitus – rock, fire, water, dirt

9. What phase of mitosis would happen next after this phase (in the photo)?
    A. Prophase
    B. Anaphase
    C. Telophase
    D. Metaphase



10. In which situation is more work done?
    A. lifting a 75 N bowling ball 2 m off the floor
    B. lifting two 30 N bowling balls off the floor 1 m
    C. lifting a 50 N bowling ball off the floor 1.5 m
    D. lifting three 30 N bowling balls off the floor 1.25 m

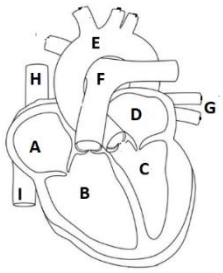
11. Pascal's principle states that a change in pressure at any point in an enclosed fluid will what?
    A. result in an increased pressure in only one part of the fluid
    B. be transmitted to the others parts depending on the distance to the part
    C. result in a decreased pressure in only one part of the fluid
    D. be transmitted equally to all parts of that fluid

12. Scientists have been conducting investigations to find out the effect of acid rain on a tree's water consumption. For several years, they have studied an area that has been treated with an acidizing fertilizer (to simulate acid rain) and compared it with an untreated area. What would be the independent variable in this investigation?
    A. the amount of water consumption by the tree
    B. the addition of acidizing fertilizer or not
    C. the types of trees on the study plot
    D. the concentration of fertilizer and water mix

13. What would be an appropriate hypothesis for this investigation?
    A. An increase in acid rain will cause an increase in growth of trees in the forest.
    B. Drought will cause trees to become more acidic and use more water.
    C. If trees receive more acid rain, the trees will produce more calcium.
    D. An increase in acidification in a forest will increase forest water consumption.

14. In chemistry, the Lewis dot formula is a visual method to show what?
    A. which neutrons are lost
    B. how atoms combine when forming compounds
    C. the charges on the electrons
    D. how many valence electrons are in an atom and how they end up when bonds form

15. What is the name of the chamber labeled “A”?



    A. left atrium
    B. left ventricle
    C. right atrium
    D. right ventricle

16. Measuring distances in space require special units. Of these listed, which is in the correct order from smallest to longest unit?
    A. parsec, light-year, astronomical unit
    B. light-year, parsec, astronomical unit
    C. astronomical unit, parsec, light-year
    D. astronomical unit, light-year, parsec

17. Clues: 1 night on this planet = 3 months on Earth, heavily cratered terrain, extreme temperatures, little or no atmosphere
    What planet is this?
    A. Neptune B. Mercury C. Venus D. the Moon

18. Janice’s class was working on a project in which they were testing water at a local pond. She was the recorder for her group and wrote down this measurement. 230 µS/cm What is this unit that her group used?
    A. statcoulomb per centimeter
    B. micro Siemens per centimeter
    C. macro seconds per centimeter
    D. micro seconds per centimeter

19. Read the list of terms below.
    leptons, quarks, protons, neutrons, electrons
    What is the commonality of this list of terms?
    A. atomic numbers
    B. subatomic particles
    C. ionic bonding
    D. positive charged

20. Factors that affect the solubility of dissolved oxygen in water include what?
    A. air temperature, conductivity, and volume
    B. pH, wind speed, and humidity
    C. water temperature, atmospheric pressure, and salinity
    D. Both A and B

21. Potable water is water that is what?
    A. polluted
    B. ionized above normal levels
    C. unsafe for human consumption
    D. safe to drink

22. Who's experiment successfully determined the charge on an electron?
    A. Niels Bohr B. Gilbert Lewis C. John Dalton D. Robert Millikan

23. Which of the following adaptation behaviors is not correct?
    A. The Texas Horned Lizard can squirt blood from its mouth when threatened
    B. Flying Fish have wing-like fins that help them to glide considerable distances to avoid predators.
    C. A vulture uses defensive vomiting to discourage predators.
    D. Japanese honeybees will mob an intruding hornet and create enough heat energy to kill it by heating it to 46 degrees Celsius.

24. Look at the shape of this fruit. What is most likely the function of the shape?
    A. insect attraction
    B. appeals to birds for food
    C. Both A and B
    D. seed dispersal by wind

25. Complete this analogy – "battery" is to a "flashlight" as " _____ is to a "cell"
    A. nucleus B. mitochondrion C. cytoplasm D. lysosome

26. In science class, the students are sitting in a darkened room with a partner and a flashlight. The students take turns looking at his/her partners eyes and then shining a flashlight on the eyes. What would they be most likely trying to observe?
    A. how the cornea controls how much light enters the eye
    B. whether or not his/her partner has a concussion
    C. the pattern changes in the sclera of the eye
    D. how the iris controls the pupil in allowing light into the eye

27. Milk would be about 6.5 on the pH scale. This makes it a what?
    A. strong acid B. weak acid C. strong base D. weak base

28. Using this chart, which statement below is true?
    A. Saturn has the highest density of all the planets.
    B. The 4 planets closer to the sun are slower than the 4 planets further from the sun.
    C. The 4 planets closer to the sun have a higher density than the 4 planets further from the sun.
    D. If Earth and Mercury could line up and race in a 100-meter dash, Earth would win.

Planet	**Average Density**	**Orbital Velocity**
Mercury	5.4 g/cm^3	47.5 km/s
Venus	5.2 g/cm^3	35.0 km/s
Earth	5.5 g/cm^3	29.8 km/s
Mars	3.9 g/cm^3	24.1 km/s
Jupiter	1.3 g/cm^3	13.1 km/s
Saturn	0.7 g/cm^3	9.6 km/s
Uranus	1.2 g/cm^3	6.8 km/s
Neptune	1.7 g/cm^3	5.3 km/s

29. How many elements make up the compound $NaHCO_3$?
    A. 3 B. 4 C. 6 D. 5

30. Which formula below is the correct one for the mineral quartz?
    A. FeS_2 B. $(Mg,Fe)_2SiO_4$ C. $CaCO_3$ D. SiO_2

31. In Palo Duro Canyon near Amarillo, TX, is a formation that stands out called the "Lighthouse".
The "Lighthouse" was formed overtime by geological means.
The climate, mineral composition, and solubility of the rock helps to vary the rates of weathering which causes interesting formations.
This is a great example of what?

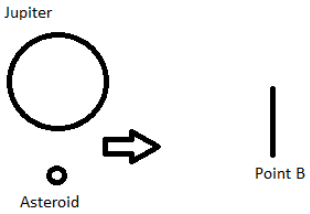
A. orogenesis
B. differential weathering and erosion
C. volcanic remnants
D. karst topography

32. When Jasmine's teacher passed out light sticks to her class, she instructed the class to design an experiment to test whether the light stick loses mass when it is activated. (The light stick contains two chemicals that are separate. When the insides are snapped, the chemicals mix which gives off light.) What would be an acceptable null hypothesis in the experiment with the light stick?
A. H_0 -The light stick will have the same mass before and after being activated.
B. H_0 -The light stick will not have the same mass before and after being activated.
C. H_1 -The light stick will give off light when it is snapped and will lose mass.
D. H_1 - The light stick will not give off light when it is snapped and will gain mass.

33. Which of the following words below belong with these listed?
Clay, Loam, Sand, _____?
A. Dirt B. Rock C. Water D. Silt

34. If Jupiter has an orbital velocity of 12.1 km/s and an asteroid was traveling 50,000 mph right beside Jupiter in the same direction from the same initial point, which one would get to point B fastest? (disregard gravitational pull or other acting forces in this situation)

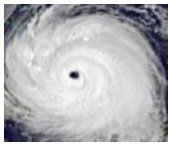
1 kilometer is approximately 0.621 miles



A. need to know the distance to point B
B. both at same time
C. Asteroid
D. Jupiter

35. Look at the terms listed below:
Epicenter, Focus, Faultline, Seismic waves
What is the commonality of these terms?
A. they help to determine the mountain formation types
B. they are all cities in Canada
C. they all involve earthquakes
D. they are places inside the Earth's crust

36. Many factors are important in determining the damage from a hurricane such as physical size of the storm, angle of impact, and how it moves. All of these affect the storm surge and flooding, but a new factor has come to light after recent Hurricanes Harvey and Dorian. What is this factor?
    A. temperature of the air
    B. water currents
    C. the jet stream
    D. stalling of the storm



37. Which seed type below is considered to be an "acorn"?

A.  Sweetgum

B.  Oak

C.  Bald Cypress

D.  Hackberry

38. Dark, thick gray clouds with usually rain or snow that cover the sky and blot out the sunlight are called what?
    A. Cirrus B. Altocumulus C. Orographic D. Nimbostratus

39. What is considered the most abundant element in the Earth's atmosphere?
    A. Nitrogen B. Hydrogen C. Carbon D. Oxygen

40. Which statement about oxygen below is not true?
    A. Warm water can dissolve more oxygen than cold water.
    B. Normally, there are about 5 or 6 oxygen molecules mixed in with a million water molecules
    C. Animals that live in water also need molecular oxygen to breathe.
    D. There are about 2 molecules out of 10 air molecules that are molecular oxygen.

41. Feral hogs in Texas cause significant ecological damage such as which of the following?
    A. negative effects on water quality
    B. consumption of native vegetation and wildlife
    C. rooting pastures and rangeland
    D. all of the above

42. Clues: one of the windiest places in the solar system, has about 13 moons - largest is Triton, this planet has a Great Dark Spot
    What planet is this?
    A. Neptune B. Mercury C. Venus D. Jupiter

43. Which of the following is not true about sulfuric acid?
    A. it is one of the most produced chemicals in the U.S.
    B. it is a colorless, syrupy liquid
    C. its boiling point is the same as water, 100 deg. C.
    D. its formula is H_2SO_4

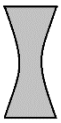
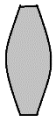
44. Cinder, Shield, and Composite are all types of what?
    A. mountain valleys
    B. magma formations under the Earth's surface
    C. Both A and B
    D. volcano types

45. What list are characteristics that can be used to identify minerals?
    A. mass, pattern on surface, scratches, color
    B. color, size, shape, luster
    C. volume, specific gravity, scratches, color
    D. luster, streak, crystal shape, cleavage, specific gravity

46. While measuring the mass of several items on a small digital scale, a student was coming up with amounts that were extremely different than the amounts the teacher posted. What would be a possible reason for the difference?
    A. the student did not "zero out" the scale when measuring the objects
    B. the student did not place the scale on a level surface when measuring
    C. the student was not using the same unit of measure as the teacher
    D. all of these

47. Which of the following is an example of a chemical change?
    A. baking a cake
    B. smashing a clay figure into a flat pancake
    C. boiling water
    D. shredding paper

48. If an optometrist wants to correct a person's vision who has hyperopia, what type of lens would work best?

A.  B.  C.  D. 

49. What does the prefix "macro" mean?
    A. large B. change C. equal D. small

50. Which hormone produced in the pancreas lowers blood glucose levels?
    A. glucagon B. epinephrine C. liver complex D. insulin

2019 - 2020 TMSCA Middle School Science Test #9 - Key

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