

# TMSCA MIDDLE SCHOOL SCIENCE TEST #5 © NOVEMBER 17, 2018

## 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<sup>x</sup>, ln x, y<sup>x</sup>, sin x, sin<sup>-x</sup>, cos x, cos<sup>-x</sup>, tan x, tan<sup>-x</sup>, 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  $\pm 5\%$  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																8A																			
1																2																			
H 1.01																He 4.00																			
3		4																5		6		7		8		9		10							
Li 6.94		Be 9.01																B 10.81		C 12.01		N 14.01		O 16.00		F 19.00		Ne 20.18							
11		12		3B		4B		5B		6B		7B		8B		1B		2B		13		14		15		16		17		18					
Na 22.99		Mg 24.31		3		4		5		6		7		8		9		10		Al 26.98		Si 28.09		P 30.97		S 32.07		Cl 35.45		Ar 39.95					
19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		36	
K 39.10		Ca 40.08		Sc 44.96		Ti 47.87		V 50.94		Cr 52.00		Mn 54.94		Fe 55.85		Co 58.93		Ni 58.69		Cu 63.55		Zn 65.38		Ga 69.72		Ge 72.64		As 74.92		Se 78.96		Br 79.90		Kr 83.80	
37		38		39		40		41		42		43		44		45		46		47		48		49		50		51		52		53		54	
Rb 85.47		Sr 87.62		Y 88.91		Zr 91.22		Nb 92.91		Mo 95.94		Tc (98)		Ru 101.07		Rh 102.91		Pd 106.42		Ag 107.87		Cd 112.41		In 114.82		Sn 118.71		Sb 121.76		Te 127.60		I 126.90		Xe 131.29	
55		56		57		72		73		74		75		76		77		78		79		80		81		82		83		84		85		86	
Cs 132.91		Ba 137.33		La 138.9		Hf 178.49		Ta 180.95		W 183.84		Re 186.21		Os 190.23		Ir 192.22		Pt 195.08		Au 196.97		Hg 200.59		Tl 204.38		Pb 207.20		Bi 208.98		Po (209)		At (210)		Rn (222)	
87		88		89		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118	
Fr (223)		Ra (226)		Ac (227)		Rf (261)		Db (262)		Sg (266)		Bh (264)		Hs (277)		Mt (268)		Ds (281)		Rg (281)		Cn (285)		Nh (286)		Fl (289)		Mc (289)		Lv (293)		Ts (293)		Og (294)	

**Specific heat of water =  $4.18 \text{ J/g} \cdot ^\circ\text{C}$**

2018 – 2019 TMSCA Middle School Science Test # 5

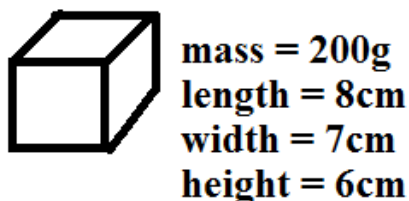
1. A bullet was fired from a gun straight up into the air from Earth's surface. What forces are acting against upward movement of the bullet to bring it back to Earth?
- A. Friction between the bullet and the air on the way up and gravity.
  - B. Friction between the bullet and the air on the way down and gravity.
  - C. Both A and B
  - D. Neither A or B

2. A hypocenter of an earthquake is basically the same as what?
- A. epicenter
  - B. focus
  - C. seismic wave
  - D. fault

3. Which of the following rocks formed at the surface of the Earth, not underground?
- A. intrusive igneous rock
  - B. intrusive metamorphic rock
  - C. extrusive igneous rock
  - D. extrusive metamorphic rock

4. Look at this chemical equation:  $\text{___H}_2 + \text{___O}_2 \rightarrow \text{___H}_2\text{O}$  Find the molar ratio for this balanced equation.
- A. 2:1:2
  - B. 1:1:1
  - C. 2:2:2
  - D. 2:1:3

5. This object with the following dimensions was on the lab counter next to a container of pure water. If it is placed in the water will it float, or will it sink?
- A. Float, it is less dense than water.
  - B. Float, it is denser than water.
  - C. Sink, it is denser than water.
  - D. Suspend, it is same density as water.



6. The 4<sup>th</sup> period class was extracting DNA from fruit and vegetables. After researching the types, they chose to use strawberries. They found out that the *Fragaria ananassa* strawberry is an octoploid. This means what?
- A. It works well for this lab activity because of having 6 sets of chromosomes.
  - B. It works well for this lab activity because of having 8 sets of chromosomes.
  - C. It will not work well because it does not have enough chromosomes.
  - D. It will not work well because it has too many chromosomes.
7. Neoteny is a rare condition in biology that happens when what?
- A. An animal species retains its juvenile traits as an adult.
  - B. An animal morphs into a new creature with totally different characteristics.
  - C. An animal species lays only one egg during reproduction.
  - D. An animal becomes catatonic after 5 years of age.

8. How many neutrons would a neutral atom of iron have?

- A. 26
- B. 56
- C. 30
- D. 82

9. Which statement about tigers is false?

- A. Tigers dislike water and will avoid it.
- B. Tigers are fast runners and can reach speeds of 65 kph.
- C. No two tigers have the same pattern of stripes.
- D. Tigers are the largest cats in the world.



10. A team of students were launching model rockets and wanted to calculate the average speed of the rocket to its apogee. What procedure should they follow?

- A. Time the rocket from when it launches to when it hits the ground. Measure how high the rocket flies from start to finish. Divide the distance by the time.
- B. Measure how high the rocket flies. Measure the time the rocket flies. Take the time and divide by the distance it travelled.
- C. Time the rocket from when it launches to its highest point. Measure how high the rocket flies to its highest point using an altimeter. Take the distance the rocket flew and divide it by the time.
- D. Multiply the time it takes for rocket to fly times the distance it travels.

11. What does the prefix “carn” mean?

- A. fun
- B. meat or flesh
- C. cat
- D. wheel

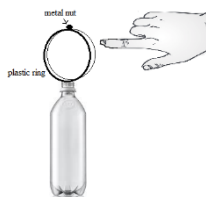
12. A scientist who would be familiar with mitochondria, lysosomes, Golgi apparatus, endoplasmic reticulum, and other organelles would most likely be a what?

- A. Cytologist
- B. Epidemiologist
- C. Ethologist
- D. Analytical chemist

13. In the prairie ecosystem, tall grasses, small shrubs, and various wildflowers are abundant. Can a prairie ecosystem be considered a “climax community”?

- A. No, because there are no tall trees or forests.
- B. No, because grass is never the final step in ecological succession.
- C. Yes, because the climate may not allow for further succession; the ecosystem is stable.
- D. Yes, because primary and secondary succession have both taken place in the prairie.

14. Alex was conducting a demonstration for science class. He balanced a plastic loop on top of an empty soda bottle (as seen in the diagram below). On top of the plastic loop, he placed a metal nut which remained balanced. When all was set, he quickly pulled the loop to the side out from under the metal nut. The metal nut fell directly down into the empty soda bottle. Which law of motion was Alex demonstrating for his class?




- A. Newton's first law of motion
  - B. Newton's second law of motion
  - C. Newton's third law of motion
  - D. Newton's fourth law of motion
15. "Bleaching" of coral along the reefs is something that is a current issue. Which statement below describes what happens during bleaching?
- A. The coral goes through a process of cleaning itself during a natural life cycle.
  - B. The coral ejects the symbiotic algae living inside them that provide nutrients and color.
  - C. The coral grows extremely cold in temperature and changes color to adjust and maintain homeostasis.
  - D. The coral gives off a chemical that causes it to turn white.
16. Baylor County Texas is one of the best places in the world to find fossils of dimetrodons. What does the name "dimetrodon" mean when you analyze the word parts?
- A. two large feet
  - B. divided large sail
  - C. two measures of teeth
  - D. short muscular reptile
17. What list correctly shows the six most common elements found in organic substances?
- A. Carbon, Hydrogen, Oxygen, Phosphorus, Nitrogen, Sulfur
  - B. Carbon, Helium, Osmium, Potassium, Sodium, Argon
  - C. Carbon, Sulfur, Nitrogen, Oxygen, Potassium, Hydrogen
  - D. Carbon, Silicon, Copper, Zinc, Iron, Hydrogen
18. When a white flower such as a snapdragon, is crossed with a red flower of the same species, the offspring may end up being pink in color. This is an example of what?
- A. codominance
  - B. incomplete dominance
  - C. polygenic
  - D. recessive

19. Which of the following scientists did not make a major contribution in the field of chemistry?

- A. Antoine Lavoisier
- B. Joseph Priestly
- C. Ptolemy
- D. Ernest Rutherford



20. The Parker Solar Probe will be one of the fastest human-made objects in the solar system when it orbits the sun travelling 430,000 miles per hour. The Juno spacecraft that went to Jupiter can travel 25 miles per second. Which of these probes will be the faster human-made object in our solar system?
- A. Juno Spacecraft
  - B. Parker Solar Probe
  - C. Both A and B
  - D. There is no way to tell with the information given.
21. Which of the following is an example of a troglophile?
- A. Texas Blind Salamander
  - B. Earthworms
  - C. Millipedes
  - D. Both B and C
22. At a nuclear power plant, there are usually towers visible with white “smoke” coming out the top. What exactly is the “smoke” leaving the top of the towers?
- A. It is actual smoke from the burning reaction taking place.
  - B. It is toxic emissions being filtered before being released.
  - C. It is water droplets that condensed from water vapor while cooling.
  - D. It is radiated steam that is released from the process.
- 
23. Eucalyptus plants produce toxic chemicals that if some animals eat this plant, it could possibly kill them. However, there is one animal that has the right genes to produce proteins that can break down these toxins. This animal can eat eucalyptus with no problem. What animal?
- A. pandas
  - B. tortoises
  - C. kangaroos
  - D. koalas
24. According to the Richter scale, each increase in number on the scale is worth how much in the increase of size of the earthquake wave?
- A. 5 times
  - B. 10 times
  - C. 20 times
  - D. 100 times
25. A crow flew by my neighbor’s tree. This crow had patches of white feathers which seemed unusual for a crow. I discovered that this crow is an example of which of the terms below?
- A. leucism
  - B. melanism
  - C. albinism
  - D. xanthochromism
26. A pair of scissors is an made of two of what type of levers?
- 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

27. Which of the following traits may be influenced by parts of the environment, such as temperature, soil pH, or nutrition?
- A. Flower color, fur color, height, weight
  - B. Disease transmission, leaf color, eye color, hair color
  - C. Ear shape, height, disease, number of toes, species
  - D. Nose shape, stem color, cell shape, mode of reproduction
28. Which of the following equations is not a balanced equation?
- A.  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
  - B.  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
  - C.  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$
  - D.  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_2$
29. An atom or molecule with a net charge that is either positive or negative is called what?
- A. isotope
  - B. ion
  - C. neutron
  - D. electron
30. What is the SI unit to measure frequency?
- A. watt
  - B. volt
  - C. Hertz
  - D. wavelength
31. An atom of hydrogen has 1 proton and 2 electrons. This means the net charge is what?
- A. 1 + (cation)
  - B. 1 - (anion)
  - C. Neither A or B
  - D. Both A and B
32. Motion involves an object's change in position relative to what?
- A. the friction that slows it down
  - B. the direction that it is moving
  - C. an object's mass and gravity
  - D. a reference point over a period of time
33. One researcher decided to test the hypothesis that e-cigarette vapors cause wounds to not heal correctly. Fibroblasts are part of connective tissue, but when an injury occurs they come to the rescue to help heal the wound. The researcher grew lung tissue fibroblasts in Petri dishes to test. He simulated an injury and then exposed the cells to e-cigarette vapors. He recorded whether or not the wound healed correctly. What is the independent variable in this experiment?
- A. The exposure to e-cigarette vapors
  - B. The wound healing properly or not
  - C. The growing of the fibroblasts
  - D. The recording of the wounds



34. Coral in the ocean is classified as which of the following?  
A. A plant                      B. an animal                      C. a plankton                      D. non-living
35. What two factors effect gravitational pull?  
A. weight and size  
B. distance and volume  
C. height and mass  
D. mass and distance
36. Jennifer printed an object on the 3D printer that she designed as an art project. The object was in an irregular shape. She knows the density of the material used in the printer and was able to measure the mass of the object. How would she find the object's volume?  
A. Take the density measurement and divide by the mass  
B. Take the mass measurement and divide it by the density  
C. Take the mass measurement and multiply by the density  
D. Take the density measurement and multiply by the mass
37. An interesting adaptation of birds is having bones that have hollow areas. Scientists think that birds have the hollow areas in their bones because why?  
A. to help with the respiratory system - it helps the bird obtain more oxygen for flight  
B. to make the bird much lighter than other animals  
C. to increase their heart rate  
D. to help with feather production
38. 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
39. The suffix "phyll" when added to a root word adds the meaning of what to the word?  
A. color                      B. green                      C. leaf                      D. plant
40. What change happens to form new substances?  
A. physical                      B. symbiosis                      C. exostosis                      D. chemical
41. Which of the following famous scientists did not work in the area of Earth science?  
A. James Hutton  
B. William Maurice Ewing  
C. Luis Alvarez  
D. Ernest Rutherford





42. An input force of 40 N is applied to a machine to produce an output force of 80 N. What is the mechanical advantage?  
A. 3200      B. 2      C.  $\frac{1}{2}$       D. 3
43. What useful material is extracted from the mineral Bauxite?  
A. plaster      B. diamond      C. steel      D. aluminum
44. Janya was talking to her cousin about the soil in her back yard. She said the soil contains Laterite. What country does Janya most likely live in?  
A. United States      B. India      C. Canada      D. Russia
45. Which of the following animal would lay eggs on land and most likely leave them afterwards?  
A. birds      B. reptiles      C. mammals      D. amphibians
46. Which of the following substance would be considered a conductor of electricity?  
A. paper      B. wood      C. pure water      D. copper
47. One of the most studied fault systems in the world is found in California. It is called what?  
A. San Andreas      B. Alpine      C. Denali      D. Humboldt
48. How many protons does an atom of the element Potassium have?  
A. 39      B. 19      C. 15      D. 84
49. What important living organisms stabilize the coastline, reduce erosion, and provide food and shelter for other living things?  
A. beach sand      B. seawall      C. swamp      D. mangroves
50. What moon of Jupiter has been considered to be able to support life because of the ocean of water believed to be under the frozen surface?  
A. Io      B. Ganymede      C. Titan      D. Europa

**2018 - 2019 TMSCA Middle School Science Test # 5 - Key**

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