



TMSCA MIDDLE SCHOOL SCIENCE TEST #3 © OCTOBER 31, 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, ln x, 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 $\pm 5\%$ 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.

1A 1																	8A 18
1 H 1.01	2A 2											3A 13	4A 14	5A 15	6A 16	7A 17	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	8B 8 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)

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

2020-2021 TMSCA Middle School Science Test #3

1. A plaque was left on the moon by Apollo astronauts that says, “Here men from the planet Earth first set foot upon the Moon...We came in peace for all mankind.” What date is on the plaque?

- A. July 20, 1968, A.D.
- B. July 1970
- C. July 1969, A.D.
- D. There is no date on the plaque.



2. I am a Russian chemist who helped to develop the Periodic Table of the Elements. I also was able to predict the discovery of some of the elements. Who am I?

- A. Priestley
- B. Claus
- C. Hess
- D. Mendeleev

3. A person who has impaired long-term memory because of brain damage, disease, shock, or trauma is considered to have what?

- A. amnesia
- B. dementia
- C. immunity
- D. concussion

4. What tool(s) would be needed to measure the density of an irregular shaped rock?

- A. graduated cylinder with water, balance scale
- B. graduated cylinder, ruler
- C. mass spectrometer, caliper
- D. beaker with water, hot plate

5. A research group was planning an investigation on the effect of vaping on lung capacity. The group set up a testing group of people who vape on a regular basis and a group of people who have never practiced vaping. They want to measure the lung capacity of each group.



What would be an important factor that they would want to consider during this investigation?

- A. the opinion that the test subjects have on cost of vaping
- B. the color of the clothing that the individuals wear during testing
- C. the type of chair that the individuals sit on during the testing
- D. the variables such as age or gender that might affect lung capacity of the individuals

6. The Greek word “planktos” means what?

- A. flat
- B. person-like
- C. swimmer
- D. drifter

7. When fossil hunting at a nearby outcropping known for marine fossils, the teacher picked up a fossil and said “this fossil has the remains of a benthic creature.” What does benthic mean?

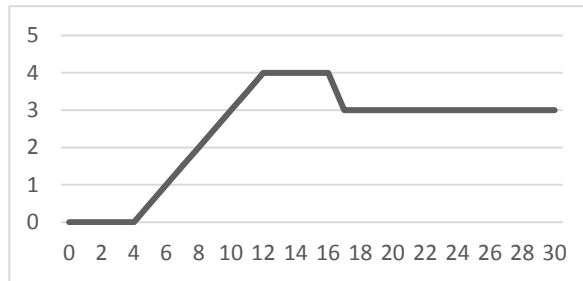
- A. living near the seashore
- B. living on or near the bottom of the ocean
- C. a fossil from the Paleozoic time period
- D. a fossil from the Cenozoic time period

8. Using the following chart information, answer the questions below.

Gas in atmosphere	Mars	Earth with life	Venus
Carbon dioxide	95%	0.03%	98%
Nitrogen	2.7%	78%	1.9%
Oxygen	0.13	21%	Trace
Argon	2%	1%	0.1

According to this information, what gases increase on a planet that sustains life?

- A. Oxygen and Argon
- B. Carbon Dioxide and Nitrogen
- C. Nitrogen and Oxygen
- D. Carbon Dioxide and Argon



9. Explain what happened in this motion graph. (x-axis is time in seconds, y-axis is distance in meters)

- A. a person went 1 meter forward, then stopped for 2 seconds, then when another meter forward, and stopped for a few seconds.
- B. a person stayed still for 4 seconds, then walked forward at a constant pace for 8 more seconds, then stopped again for about 4 seconds, went back 1 meter, then stopped.
- C. a person stopped for 4 seconds, then walked forward 4 meters before turning around to walk back 4 meters.
- D. a person ran forward 4 meters and then ran back 4 meters

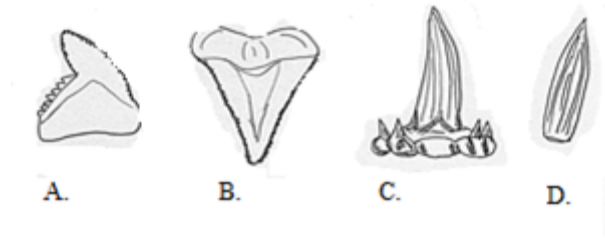
10. Which list below contains only heterotrophs?

- A. carnivores, herbivores, omnivores, decomposers
- B. dogs, cats, fish, house plants
- C. decomposers, fungi, algae
- D. zooplankton, phytoplankton, bacterioplankton, virioplankton

11. The chemical structure for chlorophyll and hemoglobin are similar. What is the main difference?

- A. hemoglobin is built around Fe and chlorophyll is built around Mg
- B. they are not in any way similar
- C. chlorophyll is only found in animals and hemoglobin is found in plants
- D. chlorophyll has more Carbon, Hydrogen, and Oxygen molecules.

12. Janelle was making some drawings of shark teeth in her journal. She read that the Latin word “cladus” means branch and “odon” means tooth. Which of her drawings below would be of a cladodont from a Devonian shark?



13. What factors can determine a person’s lung capacity?

- A. gender and age
- B. strength of the diaphragm
- C. disease
- D. all of these are factors

14. Around 1995, a group of middle school students from Minnesota were doing some field work at a local pond and found an unusually large number of deformed frogs. Some of the frogs were missing legs, some had extra legs, and problems. They found that these happen when there is what?

- A. unusually warm spring and summer season
- B. a large number of frogs living in a confined space
- C. a change or mutation in the DNA of the frogs’ cells
- D. a surge in regeneration of limbs due to predation by snakes

15. After the middle school students reported their findings to authorities, some environmental scientists came up with some possible reasons for the deformed frogs. Which of the following ideas would most likely not be a reasonable answer for the deformations?

- A. caused by agricultural pesticides that polluted the pond through runoff
- B. the frogs had trematode parasites when they were developing limbs
- C. caused by increased ultraviolet radiation from the sun
- D. caused by deadly amphibian fungus called *Batrachochytrium dendrobatidis*

16. Embedded in the upper wall of the right atrium is a small cluster of cardiac muscle cells. This cluster of cells cause an electrical stimulus in a regular rhythm for the heart. What do these cells make up?

- A. sinoatrial node B. coronary pulse C. vena cava D. ventricle

17. Circulation of the blood between the heart to the lungs is called what?

- A. systemic circulation
- B. pulmonary circulation
- C. plasmatic movement
- D. cardiovascular propulsion

18. On a windy day, you might see clouds that look like breaking ocean waves. These clouds are formed when two layers of the atmosphere contain air that are moving at different speeds. What is this type of cloud named?

- A. Cirrostratus
- B. Newton- Hertz
- C. Lenticular
- D. Kelvin-Helmholtz



19. In instrument used to measure wind speed is a what?

- A. thermometer
- B. anemometer
- C. spirometer
- D. barometer



20. Matt and his friend, Jason, were outside playing soccer. They could hear thunder off in the distance. Matt told his friend that they need to go inside because of lightning nearby. Jason said that they didn't need to worry because the thunderstorm was not over them. Which statement below best supports Matt's argument?

- A. Lightning will not strike over 5 miles from the storm.
- B. Thunder and lightning are not related.
- C. Lightning has an exact reach length of 8 km so as long as they are out of that range, they are safe.
- D. According to the National Weather Service, if you hear thunder then you are close enough for lightning to strike.

21. Samantha heard the tour guide at the local museum of natural history say that the animal skeleton that she was looking at was a tetrapod. What does this mean?

- A. it walked on 2 legs
- B. it was a 4-legged vertebrate
- C. it was a 4-legged invertebrate
- D. it had no legs and scoots on the ground

22. Which of the following has the most effect on climate of an area?

- A. population
- B. topography and distance from equator
- C. number of forests located here
- D. soil type

23. Complete this analogy: moon is to Earth as Io is to _____.

- A. Saturn
- B. Mars
- C. Jupiter
- D. Venus

24. In the electromagnetic spectrum, waves are arranged by the size of the wavelengths. Which list below is a correct arrangement from shortest wave length to longest wavelength?

- A. infrared, visible light, ultraviolet, radio waves, microwaves, x-rays, gamma rays
- B. radio waves, microwaves, infrared, visible light, ultraviolet, x-rays, gamma rays
- C. gamma rays, x-rays, ultraviolet, visible light, infrared, microwaves, radio waves
- D. radio waves, infrared, microwaves, ultraviolet, visible light, gamma rays, x-rays

25. You and your friend are trying to move a big box located on the floor. You push on the box with a force of 30 N toward the door. Your friend pulls on the box with a force of 35 N toward the same door. What is the net force acting on the box by you and your friend?

- A. 5 N to the door
- B. 65 N to the door
- C. 65 S away from the door
- D. -5 N away from the door

26. According to the laws of motion, when a model rocket is placed on the launch pad, it would not go anywhere until an unbalanced force acted upon the rocket. Which law of motion does this illustrate?

- A. Newton's first law
- B. Newton's second law
- C. Law of inertia
- D. Both A and C are correct

27. Which of the following is not a characteristic of animals?

- A. mobility B. diploidy C. highly specialized cell wall D. blastula formation

28. What forms a zygote?

- A. egg B. blastula C. sperm D. Both A and C

29. If scientists were exploring a new planet and found a possible lifeform, which of the following would they look for first to determine if it is classified as a living organism?

- A. breathing B. heart beat C. blood D. cells

30. One base is missing from this list of bases that make up DNA.

Which one is missing?

Guanine, thymine, adenine, and ?

- A. uracil B. phosphate C. trytosine D. cytosine

31. Which of the following diseases are directly related to the lungs?

- A. diabetes B. obesity C. nephritis D. emphysema

32. What collects all of the oxygen-poor blood from the body and brings it back to the right atrium of the heart?

- A. carotid
- B. pulmonary artery
- C. right and left ventricles
- D. superior & inferior vena cava

33. Finish this analogy. Laurasia is to the northern hemisphere as what is to southern hemisphere?

- A. Gondwana
- B. Wakanda
- C. Gaia
- D. Eurasia

34. Why is hydrogen peroxide put in a brown, opaque bottle?

- A. because the pH of hydrogen peroxide is too high
- B. because of its acidic nature, it does not work well in glass
- C. because it will smell bad if it is any other color bottle
- D. because it will chemical react to light and start to break down

35. What part of an atom is electrically positive?

- A. neutron
- B. electron
- C. proton
- D. nucleus

36. In chemistry, a mole is a what?

- A. The amount of substance containing the same number of chemical units as exactly 12 grams of Carbon 12.
- B. The SI base unit for measuring molecular distance
- C. Both A and B
- D. A mole is 12 molecules of a substance which is equal to its atomic mass

37. What unit below would be the most appropriate to use to measure the height of a 15-year-old tree?

- A. millimeters
- B. centimeters
- C. meters
- D. kilometers

38. What would come next in the taxonomic classification for the American Bumble Bee?

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Hymenoptera
Family: ???

- A. Ursidae
- B. Primates
- C. Nymphalids
- D. Apidae

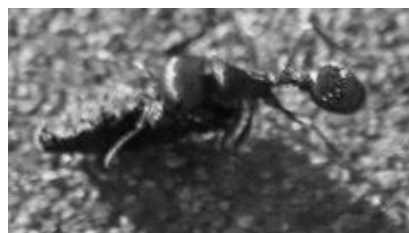


39. Red blood cells live about how many days before they die and then parts are recycled?
A. 365 days B. 120 days C. 20 days D. 1 year

40. What layer of the atmosphere would you find the Ozone layer?
A. troposphere B. stratosphere C. mesosphere D. ionosphere

41. Which of the following elements make up a water molecule?
A. Hydrogen B. Oxygen C. Helium D. Both A and B

42. Red harvester ants live in colonies with a Queen who produces worker ants to carry out the jobs for the colony. Which statement below is true about the worker ants?



- A. the worker ants are all female
- B. the worker ants can reproduce
- C. the worker ants have one job only, foraging
- D. the worker ants are all male

43. Carlos kept a journal and recorded observations of the plants he was growing. He wrote down information on the leaves, the color of the leaves, any specific smells emitted, direction of growth, and more. He also measured the height of the plant every day. Which of the following is example of a quantitative observation that Carlos made?

- A. shape of leaves
- B. specific smells observed
- C. color of the leaves
- D. the height of the plants

44. Which of these metals would be attracted to a magnet?
A. iron B. nickel C. cobalt D. all of these

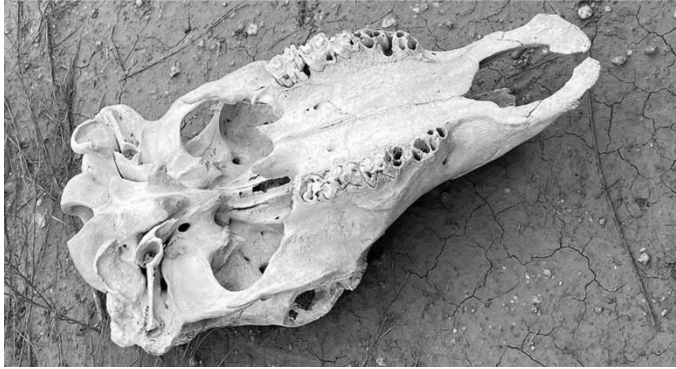
45. Copper can be made into thin sheets and also into wire. That means that copper is which of these?

- A. a conductor with no luster
- B. ductile and ionic
- C. has an atomic mass of 60
- D. malleable and ductile

46. He, Kr, Ne, Ar, and Xe are all considered to be what?
A. elements with less than 50 electrons
B. elements that combine easily into compounds
C. are elements on the left side of the periodic table
D. Noble gases

47. What metalloid is used quite often in making computer chips because of its special qualities as a semiconductor?

- A. Silicon B. Argon C. Antimony D. Both B and C



48. Three members of a biology class went out in the field to collect specimens for study. They came across a skull of an unknown animal. In order to identify what type of animal it was, they took a closer look at the teeth. The teeth of this animal are a clue to this being a what?

- A. carnivore, it has sharp teeth for ripping and tearing meat
B. omnivore, it has sharp teeth for tearing and molars for crushing and grinding
C. herbivore, it has molar teeth for crushing and grinding
D. decomposer, it has specialized teeth for eating decayed matter

49. This chemical formula $C_{12}H_{22}O_{11}$ stand for what substance?

- A. glucose B. fructose C. dextrose D. sucrose

50. On a very stormy day with an overcast sky of clouds, which telescope could still be used to collect data from space on this day?

- A. refracting
B. reflecting
C. electromagnetic
D. radio

2020 - 2021 TMSCA Middle School Science Test #3 - Key

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