



# TMSCA MIDDLE SCHOOL SCIENCE TUNE-UP TEST © 2021

## 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.

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 – Tune Up



1. Which statement about trees is not true?
  - A. Trees have been on Earth for about 370 million years.
  - B. Trees take carbon dioxide from the air.
  - C. There are currently no natural trees on the continent of Antarctica.
  - D. Scientists have estimated the number of trees on Earth to be only 1 billion.
  
2. A scientific term for the measles virus is what?
  - A. Rubella
  - B. Roseola
  - C. RSV
  - D. Rubeola
  
3. What rock is also known as “volcanic glass”?
  - A. granite
  - B. obsidian
  - C. gabbro
  - D. marble
  
4. A multicellular organism develops from a single-celled what?
  - A. egg
  - B. blastula
  - C. sperm
  - D. zygote
  
5. Which of the following explains the relationship or differences between elements and compounds?
  - A. elements are made up of compounds
  - B. compounds are made up of elements
  - C. compounds are considered pure substances and elements are not
  - D. only elements can make up matter

6. The city was planning on building a parking area in a nearby park. They wanted to know which location would be the best place to build the parking area with the least effect on the wildlife. To find out, they decided to do a one-hour survey for a two-week period to find out what animals visited in four possible locations of the park.

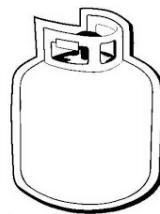
The numbers represent the average sightings for the survey period.

Location	Birds	Squirrels	Butterflies	Frogs/Toads
A	25	2	10	0
B	12	2	8	2
C	7	0	2	0
D	26	4	12	6

Using the data collected, what would be the best location to build the parking area with the least effect on wildlife observed?

- A. A, because they saw no frogs/toads
- B. B, because the numbers were the highest
- C. C, because the averages were the lowest in all categories
- D. D, because the averages were the highest in all categories

7. Which of these is not true about mass and weight?
- A. mass is measured with a balance and weight with a spring scale
  - B. weight is expressed in newtons and mass is in kilograms
  - C. mass may change depending on location and weight does not change
  - D. weight depends on gravitational force and mass is not
8. Jenny was looking up into the sky on a beautiful clear day. She saw some clouds that appeared to be puffy and looked like cotton balls. What type of clouds did she see?
- A. stratus      B. cirrus      C. cumulus      D. cirrostratus
9. In physics, a law states that for a given mass at constant temperature, pressure and volume are inversely proportional. What is the name of this law?
- A. Moore's Law      B. Pascal's Principle      C. Charles's Law      D. Boyle's Law
10. The lithification process of sediments being transformed into sedimentary rock has two parts. What are the two parts?
- A. weathering and erosion
  - B. sedimentation and deposition
  - C. wind and water
  - D. compaction and cementation
11. Bird eggs can come in different colors and patterns. If a wild bird egg is plain, bright white, such as an owl egg, it is most likely to be laid in what location?
- A. high in a spherical nest on a treetop
  - B. inside the hole of a tree
  - C. in an open field
  - D. on the ground
12. What is a chemical property of propane gas?
- A. nonreactivity with oxygen
  - B. flammability
  - C. rusting
  - D. malleability



13. This cloud type is a high-altitude cloud that has a puffy, patchy appearance with small spaces between the clouds. They often form wave-like patterns. What cloud is this?
- A. altostratus      B. cirrocumulus      C. nimbostratus      D. cumulonimbus

14. What is the ultimate source of energy found in coal?
- A. thermal energy      B. potential      C. sunlight      D. mechanical energy

15. What type of organisms would you find in the limnetic zone of a water body?
- A. cattails, lotus, reeds
  - B. crabs, invertebrates, worms
  - C. trout, catfish, turtles
  - D. phytoplankton, zooplankton, and pelagic animals
16. Many of the chemical symbols used in the periodic table of the elements come from the Latin words to those elements. Why is iron's symbol Fe?
- A. the Latin word for iron is *festum*
  - B. the Latin word for iron is *ferment*
  - C. the Latin word for iron is *femoral*
  - D. the Latin word for iron is *ferrum*
17. One of the important jobs of the Golgi apparatus in a cell is to what?
- A. provide energy
  - B. modify proteins
  - C. control reproduction
  - D. provide the interior framework for the cell
18. Diana mixed three tablespoons of salt into some warm water. Which of the following is true about the solution she made?
- A. The salt is solvent and the water is the solute.
  - B. The salt is the solute and the water is the solvent.
  - C. The water and salt together are called the solvent.
  - D. The salt is only the solvent.
19. What is known as the "universal" solvent?
- A. salt      B. water      C. air      D. soil
20. Which of these is a list of only amphibians?
- A. caecilians, lizards, crocodiles, toads
  - B. frogs, toads, salamanders, caecilians
  - C. newts, toads, geckos, frogs
  - D. frogs, toads, lizards, salamanders
21. Which of the following results in two identical daughter cells?
- A. chromosomal mutation      B. mitosis      C. somatic      D. meiosis
22. What enzyme found in the human body is used to break proteins down into amino acids?
- A. trypsin      B. Cas9      C. lactase      D. maltase
23. An area where the freshwater coming from a river flows into the salty water of the ocean (which makes a great place for many marine species to reproduce) is called what?
- A. spring      B. estuary      C. gulf      D. riparian area

24. The class Mammalia includes moles, bats, armadillos, and whales as well as many others. The next classification would be Order. Which of the following charts correctly classifies the into Orders?

A.

Moles	Chiroptera
Bats	Eulipotyphla
Armadillos	Rodentia
Rats	Cingulata

B.

Moles	Eulipotyphla
Bats	Rodentia
Armadillos	Cingulata
Rats	Chiroptera

C.

Moles	Chiroptera
Bats	Cingulata
Armadillos	Eulipotyphla
Rats	Rodentia

D.

Moles	Eulipotyphla
Bats	Chiroptera
Armadillos	Cingulata
Rats	Rodentia

25. Which of these show a correct order from most recent period to oldest on the Geologic Time Scale?

- A. Tertiary, Cretaceous, Jurassic, Triassic, Permian
- B. Permian, Cretaceous, Tertiary, Triassic, Jurassic
- C. Jurassic, Triassic, Permian, Tertiary, Cretaceous
- D. Triassic, Permian, Jurassic, Cretaceous, Tertiary

26. Batteries are made of three main parts. What are these parts?

- A. protons, neutrons, electrons
- B. volts, current, electrons
- C. circuit, electrode, fuel source
- D. anode, cathode, electrolyte

27. Mammals can be classified into subclasses by how they reproduce and the embryonic development. Which of the following mammals lay eggs?

- A. marsupials
- B. placental
- C. monotremes
- D. no mammals lay eggs

28. Solar winds from the sun including solar flares can cause disturbances in which of the following?

- A. satellites, spacecraft, and the Earth's electric-power grid
- B. astronauts in space, technology on Earth
- C. earthquakes, tsunamis, hurricanes, volcanos
- D. both A and B

29. This chart shows the approximate speed of sound through different mediums; however, knowing how sound travels, one of these cannot be true. Which one?

Material	m/s
Steel	5200
Silver	3650
Air	4012
Water	1480

- A. steel 5200      B. air 4012      C. water 1480      D. all are correct
30. What factors can affect the solubility of substances?  
 A. temperature      B. volume      C. pressure      D. Both A and C
31. This is the last star on the “handle” of the constellation, Little Dipper, and was historically used by sailors to find their way. What star is this?  
 A. Andromeda      B. Betelgeuse      C. Sirius      D. Polaris
32. A microorganism that can make a person sick is called a what?  
 A. leukocytes      B. antigen      C. antibody      D. pathogen
33. A plant hormone that promotes leaf detachment, inhibits a plant from sprouting, and causes the buds and seeds to stay dormant during drought conditions is called what?  
 A. indole acetic acid      B. ethylene      C. abscisic acid      D. stomata
34. The Earth’s tilt on its axis is responsible mainly for which of the following?  
 A. seasons  
 B. winds moving from west to east  
 C. earthquakes  
 D. tectonic plate movement
35. What is considered to be an extensive system of internal membranes with the function of moving proteins and other substances through the cell?  
 A. chloroplasts      B. vacuoles      C. endoplasmic reticulum      D. nucleolus
36. When measuring “power” in SI units, you should use what unit and symbol?  
 A. farad – F      B. ohm -  $\Omega$       C. watt – W      D. pascal – Pa
37. Electromagnetic waves are mathematically related between energy, wavelength, and what else?  
 A. fermion      B. angstrom      C. cycle      D. frequency

38. The specialized tissue of a plant that transports sugar or food made in the leaves to the other parts of the plant is called what?

- A. phloem      B. xylem      C. cambium      D. heartwood

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

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

40. Which of the following helps to give a person immunity to some diseases?

- A. vaccine      B. analgesia      C. remission      D. protein

41. If a person needs to move a fairly heavy object to a height of 2 meters with less force than lifting the object directly upward, he/she could use a what?

- A. an inclined plane  
B. wheel  
C. second class pulley  
D. pascal

42. Sam's teacher had some old test papers that she wanted to destroy. She placed them in a paper shredder, one by one. Sam wondered what type of change this is. What would the shredding of the paper be?

- A. chemical change  
B. physical change  
C. Both A and B  
D. Neither A or B



43. Unbalanced forces cause what?

- A. an object to float      B. equilibrium      C. energy      D. acceleration

44. Which of the following statements about earthquake primary waves is not true?

- A. Primary waves are the fastest of the seismic waves.  
B. Primary waves or "P" waves are also called compressional waves.  
C. Primary waves can only move through solids.  
D. Primary waves move as longitudinal waves.

45. Which of the following is not part of our solar system at this moment?

- A. Earth      B. Pluto      C. Voyager I      D. Comet Neowise



46. A large gray cat was resting on a cat tower's top shelf. The cat is in a state of equilibrium. The force applied by gravity on the cat on the shelf and the force applied by the shelf to the cat are what?
- A. The forces are the same, and are also in the same direction
  - B. The forces are the same, but in opposite directions.
  - C. The force that gravity applies to the cat on the shelf is slightly more than the force of the shelf to the cat.
  - D. The force that the shelf applies to the cat is more than the force of gravity on the cat.
47. Which of the following is a human disease caused by a fungus?
- A. tinea pedis      B. streptococcus      C. salmonella      D. psoriasis
48. Earth's rotation on its axis takes about how long?
- A. 365 days      B. 12 hours      C. 28 days      D. 24 hours
49. Green plants take in sunlight, carbon dioxide, and water and synthesize what with what byproduct?
- A. chlorophyll and oxygen
  - B. glucose and water
  - C. energy and oxygen
  - D. glucose and oxygen
50. A group of researchers in a large city wanted to find out if trees in urban areas grow faster than trees in rural areas. During the planning stages of this investigation, the researchers needed to consider several factors. Which factors below would be the least important to consider?
- A. the geographic location of the areas and the growing seasons
  - B. the species of tree to use for the investigation and the normal growth rate of the tree
  - C. the amount of CO<sub>2</sub> levels in the location of the investigation
  - D. the population of the state where the investigation will take place



**2020 - 2021 TMSCA Middle School Science Test- Tune Up - Key**

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