



# TMSCA MIDDLE SCHOOL SCIENCE TEST #12 © FEBRUARY 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 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			11B 11	12B 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 =  $4.18 \text{ J/g} \cdot ^\circ\text{C}$**

1. Which of the following clouds has little vertical development:  
**A)** altostratus                      **B)** altocumulus                      **C)** cirrus                      **D)** nimbostratus
2. The number  $4.56 \times 10^{11}$  has how many zeroes?  
**A)** 9                      **B)** 11                      **C)** 0                      **D)** 13
3. Jeff walks west in a straight path for 100 meters and then east in a straight path for 150 meters. What is the magnitude of his displacement, in meters?  
**A)** 50 meters                      **B)** 100 meters                      **C)** 150 meters                      **D)** none of the above
4. Which of the following is not a measurement of speed?  
**A)** mach                      **B)** Newton                      **C)** knots                      **D)** m/s
5. How many neutrons would the isotope of hydrogen called deuterium have?  
**A)** 1                      **B)** 2                      **C)** 3                      **D)** 0
6. What is the name for the biochemical process that converts grape juice into wine or soy beans into soy sauce?  
**A)** fermentation                      **B)** respiration                      **C)** nitrogen fixation                      **D)** photosynthesis
7. What term do scientists use for the force of gravity acting on anything that has mass?  
**A)** mass                      **B)** friction                      **C)** weight                      **D)** acceleration
8. What is the most common term for the energy an object has because of its position or configuration?  
**A)** kinetic                      **B)** potential                      **C)** acceleration                      **D)** proximate
9. Which of the following can sometimes result after a moderate to severe blow to the head:  
**A)** Down syndrome                      **B)** meningitis                      **C)** impetigo                      **D)** concussion
10. What is the environmental factor most directly involved in phototropism?  
**A)** gravity                      **B)** force                      **C)** light                      **D)** temperature
11. Which of the following is the BEST example of the chemical weathering of rock:  
**A)** cracking of rock by plant roots                      **C)** frost action  
**B)** rain percolating through limestone                      **D)** abrasion
12. Which of the following is a product found in most toothpastes for the purpose of making the teeth more resistant to decay by promoting remineralization:  
**A)** fluoride                      **B)** melamine                      **C)** titanium dioxide                      **D)** diethylene glycol

13. What color would you see if all colors other than green are absorbed by a material?  
**A)** red                      **B)** blue                      **C)** green                      **D)** black
14. Which of the following terms is used by microbiologists for a bacterium with a sphere shape:  
**A)** bacillus                      **B)** coccus                      **C)** spirilla                      **D)** pili
15. What planets are able to pass between the Earth and the Sun?  
**A)** Mercury and Venus                      **C)** Mars and Mercury  
**B)** Venus and Mars                      **D)** Mars and Neptune
16. What biological polymer is paper most commonly composed of?  
**A)** glycogen                      **B)** protein                      **C)** peptidoglycan                      **D)** cellulose
17. What is the common name of the members of the Class Aves?  
**A)** mammals                      **B)** reptiles                      **C)** amphibians                      **D)** birds
18. Which of the following does not contain a cell wall?  
**A)** fungi                      **B)** amoeba                      **C)** moss                      **D)** oak tree
19. What is the most common term for the biological polymer found in chromosomes that carries genetic material?  
**A)** DNA                      **B)** RNA                      **C)** histones                      **D)** alleles
20. Inside what human cell organelle does replication of the chromosomal DNA in preparation for mitosis occur?  
**A)** ER                      **B)** nucleus                      **C)** mitochondria                      **D)** lysosome
21. Which of the following is not considered a simple machine?  
**A)** lever                      **B)** ramp                      **C)** pulley                      **D)** bicycle
22. If an animal has 42 chromosomes in its normal, non-gamete or somatic cells, what term would be given to the gametes that have 21 chromosomes:  
**A)** somatic                      **B)** unigentic                      **C)** haploid                      **D)** solitary
23. A car is traveling at a constant speed of 20 kilometers per hour on a long straight road. How many minutes will it take to travel a distance of 5 kilometers?  
**A)** 5 minutes                      **B)** 15 minutes                      **C)** 20 minutes                      **D)** 4 minutes
24. The best evidence for the model of Earth's interior comes from the study of:  
**A)** seismology                      **B)** paleontology                      **C)** paleomagnetism                      **D)** glaciology

25. Which of the following is NOT true:

- A) compounds have atoms from more than one element
- B) atoms can bond together to make molecules
- C) all helium atoms have one more proton than all hydrogen atoms
- D) all oxygen molecules have 8 neutrons

26. Most blizzards that strike the continental U.S. most directly originated in which of the following locations:

- A) the Gulf of Alaska
- B) the Gulf of Mexico
- C) along the Gulf Stream
- D) in the North Sea

27. What terrestrial planet rotates in an opposite direction to the planet Earth?

- A) Venus
- B) Neptune
- C) Jupiter
- D) Saturn

28. Which of the following is a region of Earth's atmosphere where convection is most likely to take place:

- A) troposphere
- B) stratosphere
- C) tropopause
- D) thermosphere

29. Molasses flows more slowly than water. What is the most common scientific term for the ability of different substances to flow more or less freely?

- A) friction
- B) viscosity
- C) density
- D) pressure

30. Bioluminescence in marine organisms is important for all but which of the following functions:

- A) attracting prey
- B) communicating with other organisms
- C) illumination
- D) buoyancy

31. Which of the following will occur when an unbalanced force acts on an object:

- A) the object will stop
- B) the object will lose heat
- C) the object will accelerate
- D) the object will melt

32. Which of the following is the MOST likely underlying reason why trees evolved with the capacity to grow tall:

- A) to absorb more carbon dioxide
- B) to enhance transpiration
- C) to compete for sunlight
- D) to produce more oxygen

33. Consider a star observed just above the horizon in the western sky at dusk. Where would it most likely have been at sunrise that day:

- A) in the same position
- B) just above the horizon in the eastern sky
- C) high in the western sky
- D) high in the southern sky

34. Which of the following organisms is not considered reptiles?

- A) snake
- B) newt
- C) anole
- D) lizard

35. What is the ideal mechanical advantage of a ramp that is 24 meters long and 4 meters higher at one end versus the other?  
**A)** 4                                      **B)** 24                                      **C)** 6                                      **D)** 8
36. What is the name of the blood vessels in vertebrate bodies where most of the exchange of oxygen and carbon dioxide occurs?  
**A)** arterioles                              **B)** arteries                              **C)** veins                              **D)** capillaries
37. What specific part of the human brain is most responsible for regulating body temperature?  
**A)** hypothalamus                              **B)** medulla                              **C)** cerebrum                              **D)** pons
38. Which of the following is the study of trees:  
**A)** arachnology                              **C)** planktology  
**B)** dendrochronology                              **D)** lepidopterology
39. Giant kelp found in oceans do NOT possess which of the following structures:  
**A)** holdfasts                              **B)** gas bladders                              **C)** stipes                              **D)** roots
40. People who are lactose intolerant are unable to digest the sugar present in which of the following:  
**A)** milk                              **B)** wheat                              **C)** peanuts                              **D)** eggs
41. What parts of a flower make up the corolla?  
**A)** petals                              **B)** sepals                              **C)** reproductive structures                              **D)** leaves
42. In the United States, what crop is primarily used for ethanol fuel production?  
**A)** wheat                              **B)** bacteria                              **C)** soy                              **D)** corn
43. How many heart chambers does a shark have?  
**A)** 3                              **B)** 2                              **C)** 4                              **D)** 1
44. What is the name for the plastic-ware consisting of two overlapping round plastic or glass dishes used by microbiologists in which to grow bacteria?  
**A)** forceps                              **B)** petri dish                              **C)** centrifuge                              **D)** crucible
45. In which of the following areas of the human body would you find the sacrum?  
**A)** head                              **B)** lower back                              **C)** femur                              **D)** foot
46. What letter is most often used by scientists as a symbol for light or the speed of light?  
**A)** a                              **B)** P                              **C)** m                              **D)** c
47. Which of the following terms do biologists most often use to describe animals that do not move by their own design or effort:  
**A)** saprophytic                              **B)** instar                              **C)** motile                              **D)** sessile

48. What is the base nucleotide to which adenine binds on its opposing strand in DNA?  
**A)** thymine                      **B)** adenine                      **C)** guanine                      **D)** cysteine
49. Which of the following terms is MOST commonly used to refer to the copying of DNA during the cell cycle:  
**A)** duplication                      **B)** replication                      **C)** translation                      **D)** complementation
50. What is the name for the structures in plants that regulate air entering the plant through stems and leaves?  
**A)** stomata                      **B)** cuticle                      **C)** mesophyll                      **D)** petiole

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