



# TMSCA MIDDLE SCHOOL SCIENCE TEST #11A © FEBRUARY 20, 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.

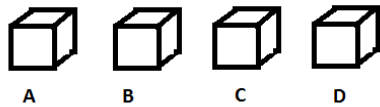
1A 1																	8A 18
1 H 1.01	2A 2											3A 13	4A 14	5A 15	6A 16	7A 17	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	3B 3	4B 4	5B 5	6B 6	7B 7	8B 8 9 10			1B 11	2B 12	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	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 #11A

1. An interesting rare element called Tellurium is used in the making of re-writable CDs and DVDs. What is its atomic number?  
A. 128                      B. 52                      C. 42                      D. 65
2. When measuring electrical resistance in SI units, you should use what unit and symbol?  
A. ohm –  $\Omega$               B. farad - F              C. watt – W              D. pascal – Pa

3. Sandy was trying an investigation in the science lab with identical cubes of a variety of materials. (see illustration below)



Cube	Sink or Floats
A	sinks
B	floats
C	floats
D	sinks

When she finished testing them, she was curious to what would happen if she firmly glued B to C. Would it sink or float?

- A. they would sink partly or stay suspended in the water
  - B. they would sink because the combined mass would be more
  - C. there is no way of knowing with this information
  - D. they would float
4. According to base-pairing rules, the sequence of nitrogen bases on one strand of DNA being TGGAACA will only pair with which sequence on the other strand?  
A. ACCTGGT  
B. TGCAUCA  
C. ACCTTGT  
D. UGGAACA
  5. What type of stream only flows at certain times of the year when there is a source of water from springs or surface water? (may flow continuously for a month or more)  
A. ephemeral              B. intermittent              C. perennial              D. none of these
  6. “River” is to “lotic” as Lake is to what?  
A. stream              B. ephemeral              C. pond              D. lentic
  7. A basketball player standing on the free shot line shoots a basketball toward the net. What forces are acting on the basketball?  
A. gravity and friction  
B. drag force, buoyant force, magnus force, gravity  
C. kinetic force  
D. only gravitational force

8. The disc is suspended from a rope so that it can be lowered down in the water of a lake to check for water transparency and depth. What is this tool called?

A. Secchi disk  
B. Perry Protractor  
C. Ditzel dial  
D. Pie Testing Tool



9. Rachel Carson, an American biologist, concerned with effects of human activities on wildlife, wrote a book which possibly led to development of the EPA. What was the name of this book?

A. *Silent Spring*      B. *Origin of Species*      C. *Cosmos*      D. *The Double Helix*

10. Water molecules coming together form a spherical shape, such as a droplet. Why does water take this shape?

A. because of the adhesion property of water  
B. because of the negative charges  
C. because of the elements that make up water  
D. because of the cohesion property of water

11. Which statement is true about human blood?

A. It is red when it is outside of the body and blue when on the inside.  
B. Human blood is red because of the oxygen and the iron-rich hemoglobin.  
C. It is only red when you bleed, on the inside it has no color.  
D. It is mostly red, but sometimes black when it is full of nutrients.

12. Which of the following insects is known to be able to see in 3-D?

A. praying mantis      B. ant      C. honey bee      D. Both A and C

13. The mineral gypsum has a monoclinic crystal. What is a crystal?

A. a very valuable gemstone that are very rare  
B. extremely clear and pure glass  
C. a solid with a symmetrical, ordered, 3-D arrangement of atoms or molecules  
D. a solid with no symmetrical order, but a unique arrangement of atoms



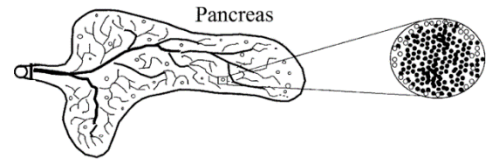
14. Which of the following statements about the moon is not true?

A. The moon's surface is covered with a powdery dust called regolith.  
B. The moon has a synchronous rotation with the Earth.  
C. The moon's phases on the same day are different in other countries.  
D. The moon helps to moderate the Earth's wobble on its axis.

15. During which change is energy released from a substance?  
A. endothermic      B. exothermic      C. precipitate      D. none of these

16. Which statement below is true about the clusters of cells found in the pancreas?

- A. The alpha cells produce glucagon and the beta cells produce insulin.
- B. The beta cells produce glucagon and the alpha cells produce insulin.
- C. The cluster of cells are called the Islets of Langerhans
- D. Both A and C are true



17. Carbon atoms have a special role in chemistry because of what true reason?

- A. The atomic weight is more than potassium, but less than Nitrogen
- B. They have four bonding sites which allows it to form a variety of molecules
- C. They have four naturally occurring isotopes.
- D. They are the basis for inorganic chemistry.

18. In science class, students were examining the earlobe types of their lab partners. Some of the earlobes were “attached” and some were “unattached”. What were the students most likely studying?

- A. the way teenagers clean their ears
- B. special mutations found in humans
- C. the inherited genetic traits of each other
- D. the way cartilage develops

19. Which of the following belongs to the order Odonata?

- A. Mayflies      B. Damselflies      C. Both B and D      D. Dragonflies

20. Which of these have the longest wavelength?

- A. radio waves      B. gamma rays      C. ultraviolet light      D. infrared waves

21. Which of the following processes involve endothermic changes?

- A. melting      B. sublimation      C. freezing      D. Both A and B

22. A plant such as saltcedar grows well in salty soil. This makes it a what?

- A. glycophyte      B. oxylophyte      C. Both A and B      D. halophyte

23. Which scientist listed is given credit for extending the cell theory to animal cells?

- A. Hooke      B. Schleiden      C. Schwann      D. Thomason

24. What part of the cell is made up of a network of protein filaments that help the cell keep its shape?
- A. plasma membrane
  - B. endoplasmic reticulum
  - C. nucleolus
  - D. cytoskeleton

25. Which of the following is an example of commensalism?
- A. epiphytes
  - B. detritivores
  - C. saprotroph
  - D. termites

26. Which of these foods is not a good source of protein?
- A. hamburger
  - B. eggs
  - C. pear
  - D. lentils

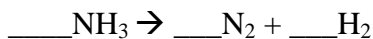
27. Which of these foods is a good source of carbohydrates?
- A. meat
  - B. bread
  - C. fish
  - D. blue cheese

28. Use this table to answer the following question.  
If a band plays the Star-Spangled Banner when the temperature was freezing and then plays it again when the temperature was 20°C, the sound waves from the music will what?

Temperature of Air (at sea level) for temperature of °C	Sound waves in m/s
0	331.5
20	343
100	386

- A. travel slower on the 20°C day
  - B. travel faster on the 20°C day
  - C. travel the same speed regardless of the temperature
  - D. travel faster on the 0°C day
29. A truck with a mass of 2 tons and a car with a mass of .5 tons are moving at the same velocity. Which of these has the most momentum?
- A. The truck and the car have the same momentum.
  - B. They both have the same velocity and so their momentum is the same also.
  - C. The truck has a greater mass; therefore, a greater momentum at the same velocity
  - D. No way of knowing unless you know are there to observe it.
30. Calcite will allow light to pass through at a translucent to transparent level. This would be an example of what physical property?
- A. streak
  - B. luster
  - C. cleavage
  - D. diaphaneity
31. Inside the sun, an atom of Hydrogen joins with another atom of Hydrogen and becomes Helium, this is an example of what?
- A. chemical reactions
  - B. nuclear fusion
  - C. deuterium
  - D. nuclear fission

32. What coefficients would make this chemical equation balanced?



- A. 2,2,1
- B. 1,1,2
- C. 1,1,1
- D. 2,1,3

33. Mumps is caused by a what?

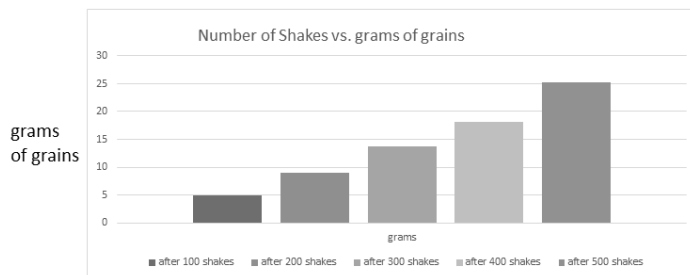
- A. bacteria
- B. virus
- C. vaccine
- D. fungus

34. Regulus is the brightest star in what constellation?

- A. Scorpius
- B. Leo
- C. Orion
- D. Ursa Major

35. Students in Mrs. King's geology class were conducting an experiment. They took a container with a screw on lid and put 10 sugar cubes inside the container with lid closed tightly. They shook the container 100 times. After shaking, they opened the container and removed the loose sugar grains broken off the cubes. Next, they found the mass of this material and recorded it in a chart. Then, they shook the container another 100 times, added the grains to the previous pile, and repeated the process of finding the mass and recording it 4 more times. The graph below shows the results. What statement explains the relationship between number of shakes and grams of grains collected?

- A. The number of grams decreased with the number of shakes
- B. As the number of shakes increased, the mass of the grains increased also.
- C. As the number of shakes increased, the mass of the grains decreased.
- D. There is no relationship between the two



36. Which of the following is most likely the main purpose of conducting this experiment?

- A. to see how chemical weathering affects the mass of rock sediments
- B. to model the affects of physical weathering and sediment production over time
- C. to practice calculating and measuring mass
- D. to see how physical weathering can produce new rock

37. If the 10 sugar cubes in the experiment above had a mass of about 4 grams each, what percentage of the cubes were broken off after 500 shakes?

- A. 62.5%
- B. 37.5%
- C. about 10%
- D. 16%

38. Is the force of friction detrimental or beneficial to us?
- A. detrimental because it can cause parts in an engine to break down
  - B. beneficial because it can cause a car to stop when we need it to stop
  - C. neither detrimental or beneficial
  - D. both detrimental and beneficial
39. If the mass of Earth were to double, what would happen to your weight amount?
- A. increase because gravity increases
  - B. decrease because gravity increases
  - C. increase because gravity decreases
  - D. not change at all
40. Zach kicked a soccer ball and the ball went forward into the net. Were the forces on the kicked ball balanced or unbalanced?
- A. balanced because the ball only changed its direction
  - B. balanced because the ball changed speed, but nothing else
  - C. unbalanced because the forces acting on the ball were equal
  - D. unbalanced because the ball changed speed and/or direction

41. What do you call the young of this organism?

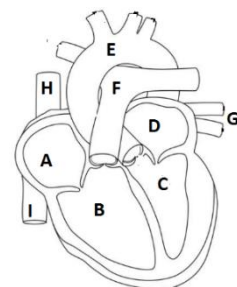
- A. naiads
- B. caterpillars
- C. maggots
- D. tadpoles



42. Earth is home to approximately how many active volcanoes?
- A. 1500
  - B. 500
  - C. 100
  - D. 10,000
43. A patient in the hospital was having problems with her pancreas. What specialist would this patient need to see?
- A. immunologist
  - B. neurologist
  - C. pathologist
  - D. endocrinologist
44. What science lab tool would be used to measure liquid in milliliters?
- A. cup marked in ounces
  - B. ruler
  - C. balance scale
  - D. graduated cylinder

45. Which chamber of this heart diagram has the function of pumping the oxygenated blood to the body?

- A. Part A
- B. Part B
- C. Part C
- D. Part D





46. When electrons are transferred from one atom to another what type of bond is formed?  
A. covalent                      B. metallic                      C. ionic                      D. scissile

47. The Hertzsprung-Russell Diagram is used to do what?  
A. classify planets and asteroids  
B. arrange comets in orbit around sun  
C. arrange black holes in evolutionary stage  
D. classify stars by several characteristics

48. Which of the following is in order from shortest to longest distance?  
A. kilometer, mile, 2,000 yards  
B. mile, kilometer, 2,000 yards  
C. 2,000 yards, mile, kilometer  
D. mile, 2,000 yards, kilometer

49. How many neutrons would a neutral atom of sodium have?  
A. 11  
B. 10  
C. 23  
D. 12

50.

<b>Automobile</b>	<b>Horsepower</b>	<b>Watts</b>
Automobile #1	420	?
Automobile #2	270	?
Automobile #3	325	?
Automobile #4	250	?

How many more watts of power would Automobile #3 have than #4?

- A. 75 W
- B. 575 W
- C. 55,450 W
- D. 55,950 W

**2020 - 2021 TMSCA Middle School Science Test #11A - Key**

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