



TMSCA MIDDLE SCHOOL SCIENCE TEST #12 © MARCH 6, 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^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.

Periodic Table of the Elements																		1A	8A																
1																	2																		
H 1.01																	He 4.00																		
3A																		2A																	
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		11		12		13		14		15		16		17		18	
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 = $4.18 \text{ J/g} \cdot ^\circ\text{C}$

2020-2021 TMSCA Middle School Science Test #12

1. Which of the following is an example of an herbivore?

- A. manatee B. coyote C. fox D. opossum

2. During a lab, students were trying to identify 4 unknown white substances. Here are the results of their tests:

Substance	Reacts with water added	Reacts with vinegar added	Turned dark with iodine
A	no	yes	no
B	no	no	yes
C	no	no	no
D	yes	yes	no

According to these results, which list below is most likely correct?

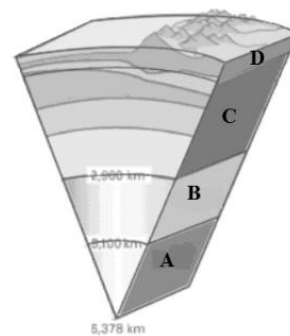
- A. Substance A is baking soda, B is cornstarch, C is sugar, and D is baking powder
B. Substance A is cornstarch, B is sugar, C is baking powder, and D is baking soda.
C. Substance A is sugar, B is baking powder, C is baking soda, and D is cornstarch
D. Substance A is baking powder, B is baking soda, C is cornstarch, and D is sugar.

3. Monarch butterfly caterpillars have developed a way to consume toxic plants so that they are not harmed by the chemicals. Milkweed plants produce toxic chemicals that affect the heart to provide protection from being eaten, but that doesn't stop the Monarchs. Monarchs eat milkweed. What are the toxins in the milkweed called?

- A. arsenic B. urushiol C. cyanide D. cardenolides

4. Match the labels to the correct names for this model of a slice of the Earth.

- A. crust-D, mantle-C, inner core-B, outer core-A
B. crust-D, core-C, mantle-B, lithosphere-A
C. crust-D, mantle-C, outer core-B, inner core-A
D. lithosphere-D, magma-C, mantle-B, core-A



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

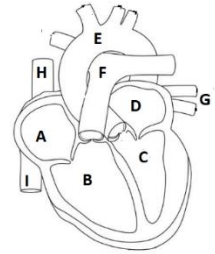
- A. mobility B. diploidy C. highly specialized cell wall D. blastula formation

6. What forms a zygote?

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

7. Which list below shows the correct order of blood passing through the heart?

- A. E to A to B to F to C to D to G to H&I
- B. E to B to A to C to D to H&I to G to F
- C. H&I to A to B to F to G to D to C to E
- D. H&I to A to B to C to D to E to F to G



8. Arif and Afan were working together on a science project. They wanted to know the light intensity in different areas of their city at night at three different times to see what area would have the best star gazing. They collected the data in the chart below.

Park Name	10:00pm Light intensity (lux)	Midnight Light intensity (lux)	2:00am Light intensity (lux)
William's Park	380	307	300
South Creek Park	420	411	408
Red Cedar Park	315	315	279

According to this data, which park would have the worst star gazing and at what time?

- A. South Creek, 10:00pm
- B. William's, 2:00am
- C. South Creek midnight
- D. Red Cedar, 2:00am

9. Using living organisms as a method of pollutant removal from water is called what?

- A. bioremediation
- B. disinfection
- C. flocculation
- D. coagulation

10. Which of the following statements below is not true?

- A. Ants can locate their dead by specific chemicals given off by the deceased.
- B. A bee can do a special dance which will give directions to the flowers she found.
- C. A prairie dog will make a different warning sound depending on whether the predator is on the ground or flying through the air.
- D. Whale songs last up to 5 minutes at the most.

11. What connects the bone to muscle in humans?

- A. tendons
- B. ligaments
- C. cartilage
- D. nothing

12. What enzyme found in the small intestine helps to break down the sugar in milk?

- A. trypsin
- B. lactase
- C. maltase
- D. Cas9

13. Bird skeletons are different from other animals in several ways. What is one of those differences?

- A. birds have an extra collarbone to keep the wing in the right position
- B. bird skeletons have true tails in their skeleton
- C. birds have a keel bone by the breastbone which anchors the wing muscles
- D. bird bones are heavier and stronger

14. Smallpox is to virus as Tuberculosis is to what?

- A. pathogen
- B. histamine
- C. mucous
- D. bacteria

15. Insects breathe air through a network of tubes. These tubes extend into the body from pairs of openings called what?

- A. mandibles
- B. spiracles
- C. coxa
- D. tarsi

16. Some plants can be tall. The roots absorb water and transport that water to the leaves that can be fairly high up. What is one of the factors involved with transporting the water that high?

- A. the leaves act as a straw to suck the water up
- B. plants have a complicated pump system to move the water
- C. plants have a muscular system that will contract and expand to squeeze the water upward
- D. water molecules have the properties of cohesion and adhesion which helps to pull water upward through xylem

17. While looking at the night sky, Andy observed a spherical, dense group of thousands of stars that all orbit a galactic core. One example is M22. What is this called?

- A. globular star cluster
- B. nebulae
- C. galaxy
- D. constellation

18. Which of the following would be a reasonable density for the Earth's core?

- A. 1.0 g/cm^3
- B. 11.0 g/cm^3
- C. 111.0 g/cm^3
- D. 1111.0 g/cm^3

19. Which planet technically does not "orbit the sun" because its shared center of mass with the sun is about 30,000 miles above the sun's surface?

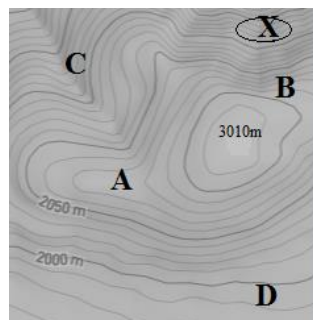
- A. Mars
- B. Neptune
- C. Jupiter
- D. Saturn

20. Which of the following statements is true about orographic clouds?

- A. They form when the air in the clouds sink.
- B. They look like waves of the ocean.
- C. They form after the thunderstorm has passed through an area.
- D. They often appear where two air masses meet over earth's topography.

21. On the map shown, location X is where a lake formed.
Which statement below would be true about this map?

- A. If it rains at location A, the runoff will go to lake X.
- B. If it rains at location B, the runoff will go to lake X.
- C. If it rains at location C, the runoff will go to lake X.
- D. If it rains at location D, the runoff will go to lake X.



22. An instrument used to measure wind speed is a what?

- A. Barometer
- B. Hydrometer
- C. Anemometer
- D. Thermometer



23. What type of map shows elevations with high and low areas marked on the land?

- A. Mercator Projection
- B. Topographical
- C. Cartographical
- D. Global

24. What is the name of the enzyme that came from bacteria in which geneticists are using to edit genes?

- A. maltase
- B. trypsin
- C. lactase
- D. Cas9

25. Which statement below about tardigrades is not true?

- A. They prefer a habitat of lichens and mosses.
- B. They only reproduce sexually.
- C. They undergo cryptobiosis to help them survive.
- D. They need a thin layer of water around their bodies to prevent dehydration.



26. Which of the following below is not true about yeast?

- A. yeast is unicellular
- B. yeast is a type of fungi
- C. yeast is prokaryotic
- D. yeast is a living thing



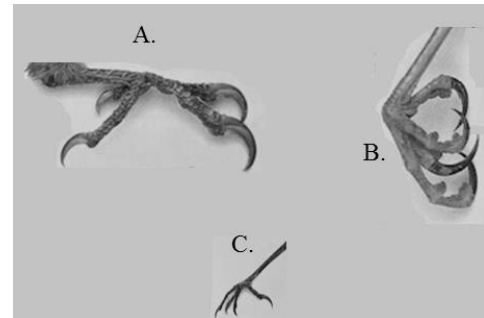
27. Alkali gets its name from the Arabic word “al qali” which means what?

- A. Metal
- B. Reactive
- C. Ashes
- D. Weak liquid

28. Look at the diagram of bird feet.

Which statement below would correctly identify the bird type to the foot type?

- A. A-climbing B-grasping C-perching
- B. A-grasping B-climbing C-perching
- C. A-perching B-grasping C-climbing
- D. A-climbing B-perching C-grasping



29. What moon phase would come next (#4)?

- A. new moon
- B. full moon
- C. crescent moon
- D. quarter moon



30. I was born in Wahoo, Nebraska in 1903. I and a colleague of mine, Tatum, were awarded the Nobel Prize for Physiology and Medicine in 1958 for work in genetics. I am known for the “one gene - one enzyme hypothesis”. Who am I?

- A. George Beadle B. James Watson C. Hermann Muller D. Gregor Mendel

31. If a creature was classified as a thermophile, where would you most likely find it?

- A. temperate soil B. glacier ice C. lukewarm water D. hot springs

32. Which part of the human brain is the center of emotional processing?

- A. Hypothalamus B. Pituitary gland C. Amygdala D. Hippocampus

33. A free-falling object only under gravity’s pull has a downward acceleration of what on Earth?

- A. 9.8 m/s^3 B. $10 \times 8 \text{ cm/s}^2$ C. 9.8 m/s D. 9.8 m/s^2

34. When Jerry was making his graph for his scientific investigation, he could not remember what his teacher told him about which variable should go where on the graph. What information does he need to remember?

- A. The dependent variable should go on the x-axis, and the independent on the y-axis.
- B. The independent variable should go on the x-axis, and the dependent on the y-axis.
- C. Most of the time, it doesn’t matter which axis you use for the variables.
- D. You only put the independent variable on the y-axis when it involves time.

35. Samantha placed two containers side by side and labeled them container A and B. Container A was filled with 500 mL of fresh water. Container B was filled with 500 mL of sea water (salt added). If Samantha places the same toy boat in A and then in B, explain what she should observe.

- A. The toy boat will float at the same position in both containers because it is less dense than water, no matter what type.
- B. The toy boat will float higher in container A than in B.
- C. The toy boat will float higher in container B than in A.
- D. The toy boat will sink in container B, but float in container A.

36. Cisco and Benavidez were discussing how the blood in your veins looks blue. Cisco said that the blood has not been exposed to oxygen and that is why it has not turned red. Benavidez said that the blood is actually always red. Who is correct and why?

- A. Cisco is correct. The blood in the veins is going to lungs to get oxygen and is not red.
- B. Benavidez is correct. Blood is shades of red. It looks blue because of the layers of skin and fat that you are looking through to see it.
- C. Both are incorrect. Blood changes color according to the amount of plasma it contains.
- D. Cisco is correct because the blood is blue until it reaches the surface.

37. Which statement below is true about sharks?

- A. Sharks have poor eyesight at night.
- B. Sharks cannot get cancer.
- C. Sharks have no bones.
- D. Sharks skin is smooth and slick.

38. Which of the following statements below is true?

- A. chewing gum will stay in your stomach for seven years
- B. shark remains don't show up in fossils since they have no bones
- C. dropping a penny from a 5-story building will kill a person below it
- D. an orca "killer whale" is the largest member of the dolphin family

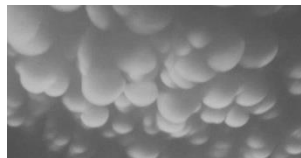
39. What part of a microscope controls the amount of light that is allowed through the stage area?

- A. Coarse-adjustment knob
- B. Ocular
- C. Stage clips
- D. Diaphragm

40. Insects are made up of three main body parts. What are they?

- A. head, thorax, wing
- B. antennae, legs, tentacles
- C. cephalothorax, body, wings
- D. head, thorax, abdomen

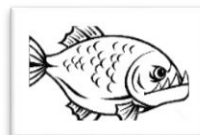
41. This type of cloud forms usually around the same time as a storm. Interestingly enough, these are formed from sinking air instead of rising air. What type of cloud is this?



- A. Lenticular B. Kelvin-Helmholtz C. Mammatus D. Cirrus

42. A healthy blood pressure for an average human being would be which of these?
A. 190/120 B. 140/90 C. 110/70 D. 130/ 80

43. Which statement below about piranhas is not true?
A. Their teeth grow in four sets and are triangular.
B. They don't chew their food, just swallow it.
C. They live in swift moving saltwater.
D. They are social feeders and eat in groups.



44. Caterpillar is to butterfly as maggot is to what?
A. dragonfly B. beetle C. grub D. fly

45. The independent variable in a scientific investigation is the variable that is chosen by the investigator for testing. Which of the following would be an independent variable?
A. The number of centimeters that the plants grow.
B. The amount of water that the plants transpire.
C. The amount of pea pods that the plant produces.
D. The species of plants used for the investigation.

46. Which planet in our solar system has a day that is longer than its year?
A. Mars B. Mercury C. Venus D. Neptune

47. The size of the mineral crystal growth in igneous rocks can tell you about what?
A. what minerals it is made of
B. where it formed
C. the age of the rock
D. the hardness of the rock

48. On the pH scale, a solution with the measure of 2 is how many times more acidic than one with a pH of 6?
A. 10 B. 100 C. 1000 D. 10000

49. When learning about chemical bonding, which subatomic particle is most important?
A. Protons B. Neutrons C. Electrons D. Quarks

50. 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

2020 - 2021 TMSCA Middle School Science Test #12 - Key

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