



TMSCA MIDDLE SCHOOL SCIENCE TEST #6 © DECEMBER 1, 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^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																	2 He 4.00
2A 2												3A 13	4A 14	5A 15	6A 16	7A 17	
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 = $4.18 \text{ J/g} \cdot ^\circ\text{C}$

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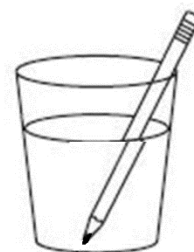
1. The Smallmouth Bass was introduced into the Guadalupe River around 1958. The state's native fish, Guadalupe Bass, didn't recognize this new fish as a different species and began to breed with these fish. The offspring of these two species is called what?
- A. purebred B. cross species C. new species D. hybrid
- 
2. Students were gathering data at the local nature center. They measured the water temperature, air temperature, and soil temperature. They also measured the wind speed, amount of precipitation, and types of clouds. Which statement below is true about their data collection?
- A. They were collecting all quantitative data.
B. They were collecting mostly quantitative data, but one type of qualitative data.
C. They were collecting all qualitative data.
D. They were collecting all qualitative data but one type of quantitative data.
3. During an experiment, Janice used a balance, a spring scale, and a graduated cylinder. What was she using each tool to measure?
- A. balance – mass spring scale – force graduated cylinder – density
B. balance- force spring scale – mass graduated cylinder – mass
C. balance – mass spring scale – force graduated cylinder – volume
D. balance – volume spring scale – density graduated cylinder – force
4. Photosynthesis is a complicated chemical reaction in which plants make their own food. Where do the light-dependent reactions take place?
- A. mitochondria - inside the cell
B. stroma – colorless fluid surrounding the grana
C. lysosomes – organelles in the cytoplasm of the cells
D. thylakoids – membrane-bound compartment inside the chloroplast
5. Plants get nutrients from the soil. What are three main nutrient types found in soil? (notated with their correct chemical symbols)
- A. Ni K Na
B. Ph Ni Po
C. N P K
D. N Ph K
6. If Mendel, during his research, crossed a homozygous wrinkle-seeded plant with a homozygous round-seeded plant, what percentage of the offspring would be wrinkled-seeded? (round-seeded trait is dominant)
- A. 0% B. 25% C. 50% D. 100%

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7. In this chemical reaction, the coefficients are missing to make this a balanced chemical equation. What would be the correct coefficients?



- A. 1 and 2
B. 2 and 4
C. 3 and 8
D. None of these will make this equation balanced.
8. What is the SI unit of electrical charge?
A. mole B. watt C. coulomb D. candela
9. This drawing shows a pencil in a glass of water. The pencil appears to be “bent”. Which statement about this drawing is true?
- A. The pencil is a trick pencil and is actually bent in the middle.
B. The water contains molecules that makes the pencil appear to be bent to your eye.
C. The law of refraction says that a solid object in a liquid will bend when viewed on the side.
D. Light travels in a straight line but has a change of velocity as it travels through a denser medium, such as water, which causes the pencil to look bent.



10. Which of the following are made of the element, carbon?
A. diamond B. graphite C. Both A and B D. none of these
11. Which of these listed is an allotrope of oxygen?
A. ozone B. oxides C. rust D. Styrofoam
12. A Salt cedar (Tamarix) is a plant that can grow under extremely saline conditions. These means that is considered to be a what?
A. halophyte B. ephemeral C. mesophyte D. xerophyte
13. On a ranch in central Texas, a large mesquite tree grew near the ranch road. Directly under the shade of a mesquite tree, there was an abundance of grass that was growing and thriving. Nearby, but not under the mesquite tree, was an area with no grass, only soil and rocks. What would be the most reasonable explanation for the grass growing under the mesquite tree?
A. The shade of the tree made it cooler which allowed the grass to grow.
B. A mesquite tree is a legume which has bacteria on its root nodules that helps to fix the nitrogen in the soil, making more nutrient rich soil.
C. The cattle on the ranch will not go under the mesquite tree; therefore, the grass is protected from being eaten.
D. Mesquite trees give off a chemical fertilizer when they lose their leaves which helps the grass grow.

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14. The rocks of Earth's mantle and crust are constantly moving because of what?
A. plate tectonics B. assimilation C. infiltration D. orogenesis
15. The era known as "the era of recent life" is known as what?
A. Paleozoic B. Mesozoic C. Cenozoic D. Precambrian
16. Jaxxon was concerned about the water quality for wildlife in a local stream near his home. He joined a group that conducts tests on the water once each month. Which of the following would be most important for them to test?
A. algae, water volume, stream direction
B. temperature, buoyancy, chlorine level
C. hardness, bacteria diversity, debris
D. pH, turbidity, dissolved oxygen

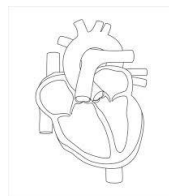
17. Using the chart to the right,

What statement below is true about the measurements made?

- A. The measurements are accurate, but not precise.
B. The measurements are accurate and precise.
C. The measurements are precise, but not accurate.
D. The measurements are neither accurate or precise.

Trial Number	measurement
1	6.458
2	6.459
3	6.458
4	6.459
Actual Measurement	4.001

18. Some humans have attached earlobes (recessive) or unattached earlobes (dominant). If a female and male parent are both heterozygous for unattached earlobes, what is the phenotypic ratio of unattached to attached earlobes for their offspring?
A. 4:0 B. 3:1 C. 2:2 D. 1:3
19. What is the rhythmic contraction of the digestive tract that helps move food to the stomach?
A. trachea B. esophagus C. epiglottis D. peristalsis
20. If the processing, packaging, and distributing of molecules of a cell is not working properly, what organelle is malfunctioning?
A. lysosome
B. mitochondrion
C. cytoskeleton
D. Golgi apparatus
21. Which side of the heart pumps the blood to the lungs?
A. Both left and right
B. Left side
C. Right side
D. The top side



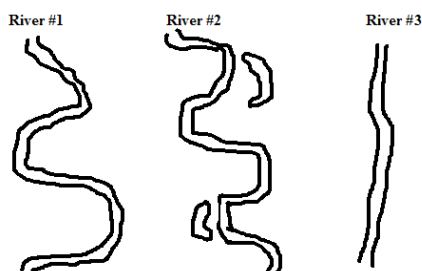
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22. Samantha had a bad case of the hiccups. Her mom told her “Stop hiccupping, Samantha! If you just think about it, you can stop.” Samantha told her mom, “I can’t, I don’t have control of my hiccupping.” Who is right and why?
- A. Samantha’s mom is correct because the cerebrum controls hiccup reflex.
 - B. Samantha’s mom is correct because the hiccup reflex is an involuntary action.
 - C. Samantha is correct because hiccup reflex is controlled by the medulla oblongata.
 - D. Samantha is correct because hiccup reflex is a voluntary action in the brain.

23. What is made in human skin when exposed to sunlight?
- A. Vitamin A
 - B. Vitamin B
 - C. Vitamin C
 - D. Vitamin D

24. Which of these rivers is most likely the oldest of all three?

- A. 1
- B. 2
- C. 3
- D. No way of telling



25. Close one of your eyes and look at objects ahead of you at a distance. Place your thumb at arm’s length toward the objects. Look with your other eye and notice that your thumb appeared to have moved position. This is a demonstration of what?

- A. eclipse
- B. parallax
- C. ellipse
- D. apogee



26. Edwin was researching riparian wildlife. What might be included in his study?

- A. bison, cattle, sheep
- B. blue crab, seahorses, manatees
- C. beaver, raccoon, river otter
- D. desert tortoise, horned lizard, roadrunner

27. If you take a hockey puck and slid it on the ice, it will continue to slide in a straight path until an unbalanced force acts upon it. This would be an example of which of Newton’s laws?

- A. 1st Law of Motion
- B. 2nd Law of Motion
- C. 3rd Law of Motion
- D. 4th Law of Motion

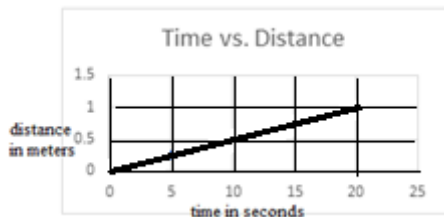
28. The atmospheric pressure on top of Mt. Everest is 1/3 that of the atmospheric pressure at sea level which is 1 atmosphere. Using the “useful information chart”, approximately how many Torr units would that equal?

- A. 760
- B. 1520
- C. 145
- D. 253

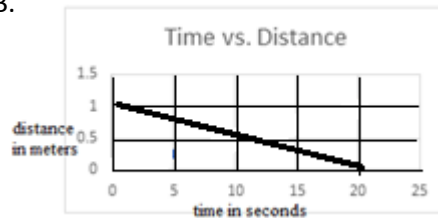
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29. What substance do scientist search for when looking for life on other planets because of its importance to sustain life as we know it?
- A. oxygen B. nitrogen C. water D. chlorophyll
30. Earth is approximately 93 million miles from the sun and is the only known planet to support life. What do scientists sometimes refer to this special zone Earth is located in?
- A. Circumstellar Habitable Zone (CHZ)
B. Convection Zone
C. Goldilocks Zone
D. Both A and C
31. One company worked on designing a solar panel that followed the sun as it moved across the sky to increase the energy production. This was based on the action of the sunflower as it also tracks the path of the sun. What is this plant behavior called?
- A. geotropism B. heliotropism C. thigmotropism D. phototropism
32. Richard was playing with an app on his tablet that would track and graph motion. He used a toy car. If the toy car drove forward 1m at a constant speed for 20 seconds then came to a complete stop, which graph would show up on his app?

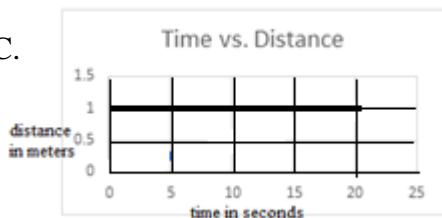
A.



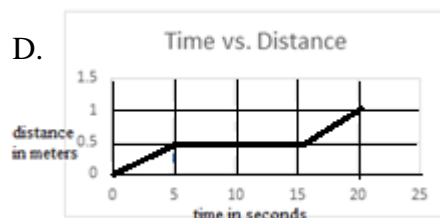
B.



C.

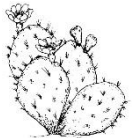


D.



33. During photosynthesis, plants use carbon dioxide, water, and the energy from sunlight to produce this substance and a bi-product.
- A. sugar and nitrogen
B. nitrates and oxygen
C. protein and hydrogen
D. glucose and oxygen
34. A major part of the human immune system includes what?
- A. hypothalamus B. vena cava C. leukocytes D. vaccines

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35. What is the SI unit for measuring volume?
A. meter B. kilogram C. cubic meter D. milliliter
36. What is considered the most abundant element in the Earth's crust?
A. Nitrogen B. Hydrogen C. Carbon D. Oxygen
37. The group 8A elements are known as what?
A. alkali earth metals
B. halogens
C. noble gases
D. metalloids
38. Prickly Pear cactus, the state plant of Texas, has a unique shape. The pads are actually _____, and the spines are modified _____.
A. leaves, flowers
B. stems, leaves
C. flowers, fruit
D. leaves, fruit
- 
39. Kirsten heard a meteorologist talk about daily high and low temperatures. She was surprised to hear about what time the low temperature normally occurs. To make sure, she researched a temperature high/low chart in her home city for 3 years. Kirsten found that the normal low temperature most often occurs _____.
A. at midnight
B. right before sunrise
C. 2 hours after sunset
D. right after sunrise
40. The cloud type that will most likely produce a thunderstorm with a possible tornado is what type?
A. cumulostratus
B. nimbostratus
C. stratocumulus
D. cumulonimbus
41. On May 18, 1980, Mt. St. Helens erupted and caused an area that was covered with life to become "like the moon". The most affected areas were replaced with volcanic rock and ash. What type of ecological succession took place afterwards in the areas that were completely devastated?
A. primary succession
B. secondary succession
C. climax succession
D. environmental succession

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42. When using flammable chemicals in glass containers, what is the best list of safety items to have in the lab?
- A. fume hood, proper ventilation system, broken glass container
 - B. MSDS for chemicals, goggles, gloves, protective clothing
 - C. fire extinguisher, safety shower, eye-wash station
 - D. all of the above



43. Chris was looking for fossils in an area near a lake. He noticed that there were outcroppings of different types of rocks. What would be the best type of rock for him to look to find fossils?
- A. extrusive igneous
 - B. metamorphic
 - C. sedimentary
 - D. intrusive igneous

44. According to the Law of Superposition, which of these layers would contain the oldest fossils?



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

45. What two factors affect gravitational pull between objects?
- A. size and shape
 - B. mass and distance
 - C. volume and molecular structure
 - D. mass and state of matter
46. You are pushing an empty grocery cart down a sidewalk at 1m/sec. According to Newton's second law, what would need to increase if the cart was filled with cans of green beans, but you want to continue at your current pace?
- A. The mass of the cart
 - B. The acceleration of the cart
 - C. The force you use to push the cart
 - D. The reaction to the cart's action
47. The Texas Horned Lizard has been on the threatened species list in Texas. Many other species have been placed on this list or the endangered species list. What are the two most common reasons for species to become endangered or extinct?
- A. lack of food and lack of water
 - B. species competition and pesticide use
 - C. climate change and invasive species
 - D. loss of habitat and loss of genetic variation

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48. Amir was comparing two substances to determine if they were metals or non-metals.
Substance A – dull, low density, brittle, insulator
Substance B – shiny, high density, malleable, conductor
What should Amir decide based on the physical properties?
- A. Substance A is a metal and Substance B is a non-metal.
 - B. Substance A and B are both metals.
 - C. Substance A and B are both non-metals.
 - D. Substance A is a non-metal and Substance B is a metal.
49. One boundary edge of the “Ring of Fire” is between the Pacific Plate and which other tectonic plate?
- A. North American Plate
 - B. Arabian Plate
 - C. African Plate
 - D. Indian Plate
50. Which Ecoregion of Texas listed below would have a cold, semi-arid climate?
- A. Pineywoods
 - B. Blackland Prairie
 - C. High Plains
 - D. Cross Timbers

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