



TMSCA MIDDLE SCHOOL SCIENCE GEAR-UP TEST © 2020-2021

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.

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 Gear-up Test

1. This *Lepus californicus* (black-tailed jackrabbit) is found on brushlands, prairies, and meadows. One adaptation is having huge ears. How do these ears help the jackrabbit survive?

- A. keeping balance while jumping
- B. providing excellent camouflage in the dessert grasses
- C. regulating its body heat with blood flow in vessels of ears
- D. helping it hear and hunt its prey

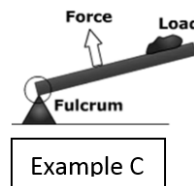
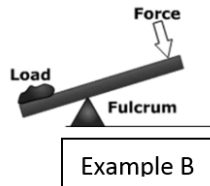
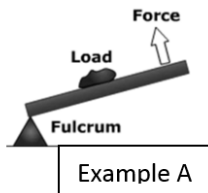


2. In a prairie food chain, the jackrabbit above would be placed between which of these?

- A. coyote and hawk
- B. grass and sunlight
- C. quail eggs and badger
- D. clover and badger

3. The jackrabbit and badger have a symbiotic relationship. What type?

- A. Commensalism
- B. Parasitism
- C. Mutualism
- D. Predator/Prey



4. Which diagram above illustrates a second-class lever?

- A. Example A
- B. Example B
- C. Example C
- D. None of these

5. Josephine needed a good conductor of thermal heat for an experiment. Which of these should she choose to use?

- A. wooden spoon
- B. glass spoon
- C. plastic spoon
- D. silver spoon

6. Which of the following statements about Earth's atmospheric layers is true?

- A. The temperature in the troposphere is higher near the surface of the Earth and decreases with altitude.
- B. The temperature in the mesosphere is lowest near the surface of the Earth and increases with altitude.
- C. The temperature in the thermosphere stays consistently 200 degrees Celsius throughout this layer of the Earth's atmosphere.
- D. Pilots do not fly in the lower layer of the stratosphere because of the constant turbulence.

7. On a rare occasion, you might see a type of cloud that is associated with thunderstorms and is found low to the horizon. It looks sort of like a long tube and is caused by cooler air lifting warm moist air. It is not attached to the base cloud. What is this cloud called?

- A. shelf cloud -type of arcus cloud
- B. crepuscular cloud
- C. lenticular cloud
- D. roll cloud - type of arcus cloud



8. Jamaal was testing type of face masks to wear to prevent the spread of a virus. He chose 5 different materials to use for constructing the masks in his experiment. He tested each mask using a laser light in a dark room and had a person wear the mask, then talk loudly while he counted particles seen in the laser light. What would be his independent variable?

- A. the time he used to make the mask
- B. the type of material used to make the mask
- C. the number of particles seen in the laser light
- D. the intensity of the laser light beam



9. This has a protein coat and a core of genetic material. It is extremely small in size. This cannot survive without a host to help with reproduction. What is this?

- A. a cell
- B. a bacterium
- C. a tardigrade
- D. a virus

10. This bird, an extremely colorful Painted Bunting adult male, with its blue, red, and green colors looks much different from its female of the same species. The female is a yellow-green color. What word describes this condition?

- A. convergent evolution
- B. harmonious brilliance
- C. sexual dimorphism
- D. sexual monomorphism



11. The climate of an area is MOST affected by what?

- A. population
- B. topography and distance from equator
- C. number of forests located here
- D. soil type

12. What would be the most correct placement of these words in this sentence?

_____ is the study of _____ conditions over a period of time.

- A. Weather, meteorology
- B. Meteorology, climate
- C. Weather, climate
- D. Climate, weather

13. What moon of Jupiter has been considered to be able to support life because of the ocean of water believed to be under the frozen surface?

- A. Titan
- B. Ganymede
- C. Io
- D. Europa

14. Much of a plant cell's volume is occupied by what organelle?

- A. central vacuole
- B. lysosomes
- C. cell wall
- D. mitochondria

15. Alfred Wegener's supercontinent was named what?


- A. Pangaea
- B. Laurasia
- C. Mercalli
- D. Earthlandia

16. Cellular respiration requires what reactant(s)?
A. air B. glucose C. oxygen D. both B and C
17. Which list below BESTS represents all unicellular microorganisms?
A. viruses, helminths, protists
B. tardigrades, paramecium, bacteria
C. fungi, flagellates, invertebrates
D. bacteria, protozoa, yeasts
18. If Norman wants to move a refrigerator to a height of 2 meters with less force than lifting it directly upward, he could use a what?
A. an inclined plane B. wheel C. second class lever D. pascal
19. Unbalanced forces cause what?
A. energy B. work C. equilibrium D. acceleration
20. What is the SI unit to measure force?
A. kilogram B. hertz C. newton D. pounds
21. Which statement below about coral bleaching is true?
A. The coral goes through a process of cleaning itself during a natural life cycle.
B. The coral ejects the symbiotic algae living inside them that provide nutrients and color.
C. The coral grows extremely cold in temperature and changes color to adjust and maintain homeostasis.
D. The coral gives off a chemical that causes it to turn white.
22. Organisms that get energy from consuming other organisms are called what?
A. somatic B. autotrophic C. heterotrophic D. prokaryotic
23. What is an important function of decomposers in an ecosystem?
A. Filtering out pollutants
B. Preventing organisms from becoming too populated
C. Returning nutrients to the soil
D. Replenishing moisture to the atmosphere
24. Which of these parts of the human brain has a major role in learning and memory?
A. Hypothalamus B. Pituitary gland C. Amygdala D. Hippocampus
25. A student was conducting an experiment to find out the temperature change of a water when placed in different colored containers in the sunlight. She used a probe to record the temperature every 5 seconds for 10 minutes. What variable is considered the dependent variable?
A. the color of the container
B. the time
C. the probe
D. the temperature



26. In this chart, which type of wind turbine has lower overall electricity generation, a horizontal axis wind turbine (MUST be facing into the wind) or a vertical axis wind turbine (does not have to face into the wind)?

- A. horizontal axis
- B. vertical axis
- C. difficult to tell with this chart
- D. they are the same

Time of Reading	Power (watts)
6:00am	HA – 30 VA - 3
12:00pm	HA – 50 VA – 8
6:00pm	HA – 135 VA – 33
	HA (horizontal axis) VA (vertical axis)

27. At 6:00pm, the vertical wind turbine produced 33 watts of power. What approximately would that be equal to in horsepower? (useful information chart)

- A. 24,608 hp B. 33 hp C. 3,300 hp D. 0.044 hp

28. What is the significance of the SpaceX launch of two astronauts on May 30, 2020?

- A. first launch of astronauts to International Space Station since 2011
- B. first launch of new satellite technology to space station
- C. denotes a successful launch of Americans to Mars expedition
- D. first crewed flight by a private company in America

29. On the pH scale, moving from 0 to 1, does what to amount of acidity?

- A. Increases the acidity 10 times
- B. Increases the acidity 100 times
- C. Decreases the acidity 10 times
- D. Decreases the acidity 100 times

30. What does the prefix “cephal” mean?

- A. leg B. bottom C. liver D. head

31. The prefix “gymno” means “bare, naked”. What does “angio” mean?

- A. tall, flower B. plant C. large D. vessel, seed

32. How many electrons does an atom of Neon have?

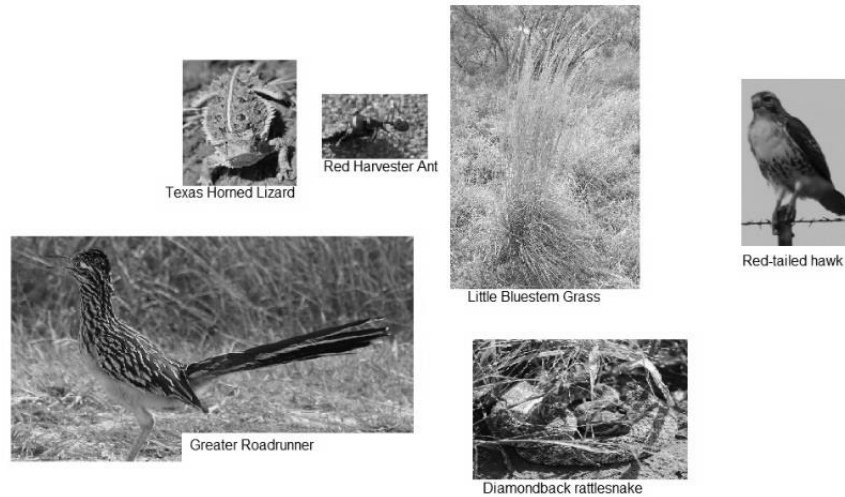
- A. 20.18 B. 9 C. 9 D. 10

33. A scientist who would be familiar with diseases found in populations of people would most likely be a what?


- A. Cytologist B. Ethologist C. Epidemiologist D. Analytical chemist

34. Which of the following minerals would be able to scratch glass?

- A. diamond B. quartz C. Both A and B D. none of these



35. Using the organisms in the photo diagram, which would be a predator/prey relationship?
- Great Roadrunner/ Texas Horned Lizard
 - Diamondback rattlesnake/ Red Harvester Ant
 - Red-tailed hawk/ Little Bluestem Grass
 - Red Harvester Ant/ Little Bluestem Grass
36. In the photo diagram above, which list below shows a proper food chain?
- Little bluestem grass→Texas Horned Lizard→Red Harvester Ant
 - Red-tailed hawk→Diamondback rattlesnake→Texas Horned Lizard
 - Greater Roadrunner→Red-tailed Hawk→Red Harvester Ant→Little Bluestem Grass
 - Little bluestem grass →Red Harvester Ant→Texas Horned Lizard→Greater Roadrunner
37. If you were to create a food web from the organisms in the photo diagram above, what would be a producer?
- Red harvester ant
 - Diamondback rattlesnake
 - Little Bluestem Grass
 - Red-tailed hawk
38. What do some scientists say is evidence of the Chicxulub asteroid collision?
- Plutonium-244 found in the K-T layer
 - 100% extinction of life on Earth
 - Both A and D
 - 120-mile diameter crater off the north coast of Yucatan Peninsula
39. Looking at a cell under a microscope you see the chromosomes lined up along the equator of the cell. What phase of mitosis are you viewing?
- Anaphase
 - Metaphase
 - Interphase
 - Cytokinesis
40. Out of the following waves on the electromagnetic spectrum, which has the shortest wavelength?
- Radio
 - Ultraviolet
 - Gamma
 - Infrared

41. What type of rock is formed from extreme heat and pressure?
A. gabbro B. sandstone C. schist D. granite
42. When a person drops an apple on the floor, it is more likely to show dark spots. What causes this?
A. bacteria spoilage
B. a parasitic microorganism
C. similar to a bruise in humans
D. enzymatic browning
- 
43. What type of energy is observed in a bowling bowl that is moving down the lane?
A. potential B. kinetic C. chemical D. static
44. If the bowling ball is moving down a 60 ft. lane and takes 2.6 seconds, what is the approximate average speed of the bowling ball?
A. 8 miles/hr B. .04 feet/sec. C. 28 feet/sec. D. 23 feet/sec.
45. An oven is being advertised that it can “Save Cooking Time!”. The oven is set up to have a heating element increase air temperature so that it will rise and then uses a fan to circulate the heat to all parts of the oven. The concept of using hot air rising in this oven displays what?
A. conduction B. convection C. radiation D. none of these
46. What constituents affect tides on Earth?
A. Sun and moon’s gravity B. Earth’s rotation C. Both A and B D. Migration
47. Which of the following is a difference between plant and animal cells?
A. Vacuoles are only in plant cells
B. Chlorophyll is only found in plant cells
C. Only animal cells have mitochondria
D. Only plants have cell membranes
48. The “white of the eye” is a protective tough supporting wall of the eye is called?
A. sclera B. iris C. cornea D. retina
49. Both Copernicus and Galileo had beliefs about the movement of the Earth around the sun. Who was born and lived first?
A. Copernicus B. Galileo C. both lived at same time D. Galileo was not real
50. Which of the following belongs in kingdom animalia?
A. coral
B. amoeba
C. fungi
D. phytoplankton

2020 - 2021 TMSCA Middle School Science Gear-up Test - Key

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