

Life Science DTAMS Assessment – Version 6
Diagnostic Teacher Assessments in Mathematics and Science—Middle School

Date _____ Start time _____ Finish time _____

Please provide the following information about yourself:

Years teaching experience (0 if preservice) _____	Last 4 digits of Social Security number (or any 4-digit number you'll remember) _____ (used as identifier on score report)
Check grade level(s) currently teaching (or will be teaching if preservice). Mark one or more that best describes your situation. <i>(please describe below if "other")</i>	Check current (or future if preservice) teaching certificate grade level(s) . Mark one or more that best describes your situation. <i>(please describe below if "other")</i>
Number of college & graduate earth science courses _____	Number of college & graduate life science courses _____
Number of college & graduate physical science courses _____	Sex (M/F) _____
Content area of teaching certificate	
Mark one or more that best describes your situation. If your certificate is a <u>general education certificate</u> that covers all subjects (e.g. as many elementary certificates do) but doesn't specifically include a separate science certification, please <u>mark "not science"</u> . If your certificate includes content areas in addition to science, please choose from the list on the right based on the science content portion only and <u>do not mark</u> the "not science" category.	not science _____ general science _____ biology/life science _____ chemistry _____ physics _____ physical science _____ earth science _____ astronomy _____ geology _____ other science _____ <i>(please describe "other science")</i>

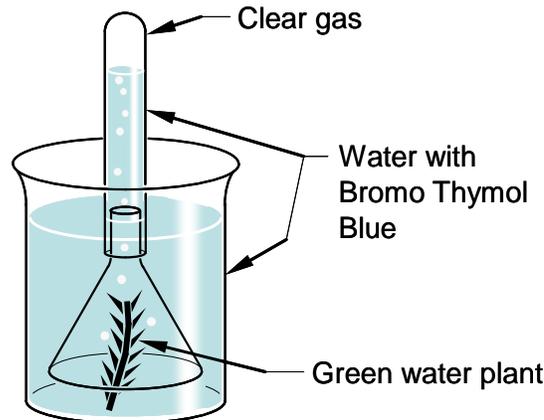
Multiple Choice

Identify and write in the space the letter of the choice that best completes the statement or answers the question.

- ___ 1. Which process produces carbon dioxide in plants, algae, and animals?
- photosynthesis
 - transpiration
 - chemosynthesis
 - respiration
- ___ 2. Each of your students has placed a green water plant under a funnel in a beaker of water to which Bromo Thymol Blue (BTB) has been added. The solution was originally blue; however, the indicator BTB will turn green or yellow in the presence of a weak acid. Each student gently blows through a straw into the beaker of water until it turns yellow. The setup is then allowed to sit in the sunlight. After several hours, the water in the beaker has turned green and bubbles are observed rising from the plant, through the water, into the inverted test tube. A clear gas has gathered at the top of the test tube.

The initial color change of the water from blue to yellow is due to

- the plant's use of acid.
- carbon dioxide collecting in the top of the test tube.
- chlorophyll leaking from the plant's leaves.
- carbon dioxide dissolving in the water.



- ___ 3. The lower magnifications of a microscope (e.g., 40X) are useful for observing
- lysosomes in the cytoplasm.
 - thylakoid membranes of chloroplasts.
 - yeast chromosomes in the cell nucleus.
 - living euglena in water.

4. You are systemically investigating the trees in a local park. Use the following taxonomic key as a tool to identify the tree represented by the tree branch and leaves below.

Identify the tree or tree type in the picture using the key above.

- a. Red Pine
- b. Larch
- c. Balsam Fir
- d. Tamarisk

KEY: for Trees with Needlelike or Scale-like Leaves:

- a. Leaves long, needlelike;
 - i. Needles in bundles or groups along twigs;
 - 1. Needles 2-5 in bunches on the branch, evergreen
 - a. Needles in bunches of five, 2-4 inches long
 - b. Needles in bunches of two, 1-2 inches long
 - 2. Needles many, more than 6, drop in autumn
 - ii. Needles occurring singly;
 - 1. Needles blunt, flat; in flat sprays on twigs
 - 2. Needles sharp; on all sides of twigs
 - a. Needles 4-sided, neither in opposing pairs nor in whorls of 3
 - b. Needles 3-sided, either in opposing pairs or in whorls of 3
- b. Leaves very small and scale-like, hugging twigs:
 - i. Leaves blunt; conifers
 - ii. Leaves sharp; a flowering tree

White Pine
Red Pine
Larch

Balsam Fir

Green Spruce

Juniper

White Cedar
Tamarisk



5. Research scientists often use mice for medical investigations. One of the primary reasons that scientists use mice is that they
- a. have comparable genetic structure to humans.
 - b. possess easily accessible genes with which to experiment.
 - c. produce multiple offspring with common genetic material.
 - d. display similar behavior patterns as humans.

- _____ 6. Tropical rainforests are a major contributor to human survival and economic well-being because tropical rainforests
- supply great amounts of unused land for cultivation.
 - protect indigenous tribes from extinction.
 - recycle large amounts of carbon dioxide.
 - provide exotic animals for human education in zoos.
- _____ 7. Which of the following best represents decreasing levels of organization?
- tissue, cell, organ, organ system
 - organ, tissue, cell, atom
 - organ, tissue, molecule, organ system
 - cell, molecule, tissue, organism
- _____ 8. A botanist's plants have stopped producing fruits. She decided to place ants in a small greenhouse labeled A to see if it will increase fruit production. She also had a greenhouse, labeled B, with the same conditions and number of plants but without the ants. Greenhouse A with the ants serves as a(an)
- experimental condition.
 - random variation.
 - control condition.
 - baseline condition.
- _____ 9. Farmers have been able to produce canola oil from herbicide tolerant "oilseed rape" seeds. Making the seeds resistant to specific groups of herbicides is a result of which process?
- genetic engineering.
 - chemical fermentation.
 - nitrogen induction.
 - multiple chemical herbicides.
- _____ 10. Which of the following hypotheses can be tested experimentally?
- People feel better in the sunlight rather than darkness.
 - People would choose a soda over water when temperatures exceed 100° F.
 - People enjoy chips over pretzels during long parties.
 - People look better in vertical striped clothing as opposed to horizontal-striped clothing.
- _____ 11. Animal organ systems do not function in isolation but rather interact in complex ways; for example, the digestive system is dependent on the proper functioning of the excretory system because the excretory system
- produces insulin to aid in digestion.
 - produces bile for excretion.
 - regulates water absorption and excretion.
 - contributes acidic liquids to aid in digestion.

- ___ 12. A pure breeding red-flowered plant with smooth seeds, (RRFF) is crossed to white-flowered plant with wrinkled seeds, (rrff). What percentage of the offspring will have white flowers and wrinkled seeds?
- 50
 - 100
 - 0
 - 25
- ___ 13. The organ that plays the major part in filtering harmful materials from the blood is the
- kidney
 - bladder.
 - heart.
 - colon.
- ___ 14. Your students expressed a misconception that hepatitis C is no longer possible to catch because of current vaccinations. What is the accepted scientific view that corrects this misconception?
- People still catch hepatitis C because the virus
- is carried by mosquitoes to unvaccinated people.
 - mutates when it contacts a vaccinated person.
 - transforms to hepatitis A or B strains.
 - is transmitted by unvaccinated people.
- ___ 15. A farmer noted that over a period of ten years, an ant species, which feeds on bean plants, became resistant to the pesticide that was being used to control it. Which of the following best explains this observation?
- Some ants developed tolerance to the spray, and their offspring inherited that adaptation.
 - Those ants with genetically determined tolerance survived and reproduced.
 - With time and asexual reproduction, the ants developed resistance to pesticides.
 - The ants learned to avoid the spray and modeled the behavior for their offspring.
- ___ 16. Why is it important to take the entire antibiotic amount that is prescribed by the doctor when one is sick?
- Surviving bacteria may become resistant to the medicine.
 - Patient will have increased susceptibility to other bacteria.
 - Surviving bacteria will mutate into a different disease form.
 - Surviving bacteria will incorporate the antibiotic into its proteins.
- ___ 17. In the food chain, grass → antelope → lion, the antelope is a(an)
- herbivore.
 - predator.
 - carnivore.
 - autotroph.

- ___ 18. Why are the forest areas along the equator similar to each other with regard to dense foliage?
- The elevation of the equatorial terrain is similar.
 - All soil found lying along the equator is rich in minerals.
 - The animal ecosystems that interact and support forests are similar.
 - The temperatures found within the equatorial regions are similar.
- ___ 19. After collecting your farm animals' solid waste, you started to toss it in the trash when a neighbor said "You should compost those droppings and add them to your garden next year." You were wondering how manure would help your garden grow. What is the primary reason your neighbor is correct in suggesting you compost your animals' droppings?
- The composted droppings acting as a natural fertilizer will return nutrients to the soil.
 - The composted droppings will provide protection for garden plants from unwanted insects.
 - The composted droppings will provide an odor to keep herbivores from the vegetables.
 - The composted clippings will provide extra heat to young plants during frosty nights.
- ___ 20. While walking along a pond's edge, you notice several frogs in the water. You learned in school that the tadpole stage is when frogs spend time in the water, so you are surprised to see adult frogs in the ponds. You wonder how long they can be submerged without coming up for air. You plan an investigation to determine the amount of time frogs can stay submerged. Which scientific technique would you select to yield the best data for this investigation?
- observation of frog behavior over time
 - physiological analysis of frog lung capacity
 - chromosomal mapping comparing tadpoles to frogs
 - chemical analysis of dissolved oxygen in pond water

Open Response

Write responses to parts **a** and **b** in the space provided. If more space is needed, please use the back of the paper and indicate that your response continues on the back.

Directions for part (a):

In each question, students expressed a misconception. Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. Explain the science in as much depth as possible, even if that level of depth would be inappropriate to expect middle school students to know. Your explanation should demonstrate a thorough knowledge of the underlying science – simply stating the opposite of the students' misconception without further explanation is not sufficient.

Directions for part (b):

Explain how you would address this misconception using best instructional practices. Please describe the classroom instruction, including what the students and teacher are doing, in enough detail so that the reader can envision what is happening. For example, if you refer to a specific activity or lesson, to the use of a piece of equipment, or to the use of specific media, assume the reader is not familiar with it and explain how it is used to support student learning. Assume you have or can get any equipment that would reasonably be available in a well-funded K-12 school setting so that your proposed instruction is feasible to implement.

21. Several students state that since the *Jack in the Box* plant's green flower is similar in color to the plant's leaves, they must have the same function.
- a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. See directions at the beginning of the open response section for more detailed directions.
- b) Explain how you would address this misconception using best instructional practices. See directions at the beginning of the open response section for more detailed directions.

22. A student lamented that she accidentally killed her mom's prize blueberry bush. She was making homemade ice cream in a churn containing salted ice. She decided to give the plant a drink on the hot summer day and dumped the salt-ice mixture from the churn near the base of the blueberry bush. She said the ice caused the blueberry bush to wilt and die.
- a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. See directions at the beginning of the open response section for more detailed directions.
- b) Explain how you would address this misconception using best instructional practices. See directions at the beginning of the open response section for more detailed directions.

23. A student tells you that his friend was just diagnosed with cancer of the mouth. The class asks this student if he is afraid to share a soft drink with his friend because they heard you can catch cancer by sharing the same drink.
- a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. See directions at the beginning of the open response section for more detailed directions.
- b) Explain how you would address this misconception using best instructional practices. See directions at the beginning of the open response section for more detailed directions.

24. While on a field trip with your class, your students look at the river and say, “This is a good example of the water cycle. While the water is running down the river, it gets hot and evaporates. Then the evaporated water in the atmosphere condenses into clouds and rains down on the same spot of the river again.”
- a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. See directions at the beginning of the open response section for more detailed directions.
- b) Explain how you would address this misconception using best instructional practices. See directions at the beginning of the open response section for more detailed directions.

25. A few students in your class have heard about various adverse effects of human genetically engineered insulin on people's health. Students discuss this information in class and believe that injecting mutated insulin into the human body is dangerous and scientists should never perform genetic engineering.
- a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. See directions at the beginning of the open response section for more detailed directions.
- b) Explain how you would address this misconception using best instructional practices. See directions at the beginning of the open response section for more detailed directions.