

Life Science DTAMS Assessment – Version 2
 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. (please describe below if "other")	Check current (or future if preservice) teaching certificate grade level(s) . Mark one or more that best describes your situation. (please describe below if "other")
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	
<p>Mark one or more that best describes your situation.</p> <p>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>.</p> <p>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.</p>	<p>not science _____</p> <p>general science _____</p> <p>biology/life science _____</p> <p>chemistry _____</p> <p>physics _____</p> <p>physical science _____</p> <p>earth science _____</p> <p>astronomy _____</p> <p>geology _____</p> <p>other science _____</p> <p>(please describe "other science")</p>

Multiple Choice

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

- _____ 1. End products of photosynthesis include oxygen and
- glucose.
 - pyruvic acid.
 - lactic acid.
 - carbon dioxide.
- _____ 2. You would like to demonstrate that light has an effect on leaves of plants. On 10 leaves of three geranium plants, you affixed 1-inch square pieces of aluminum foil. You had three similar-sized geraniums to which you did not affix aluminum foil. You placed all six plants in similar sunlight and watered them the same amount each day. A month later, you removed the aluminum foil patches from the leaves on the three plants to discover the covered patched areas were almost white. Those geraniums without aluminum foil patches did not have white spots. Which of the following would be a reasonable observation and subsequent inference?
- Observed that lack of exposure to light caused leaves to appear white and inferred that respiration was not able to occur in covered patches of leaves.
 - Observed that the leaves turned white and inferred that sunlight is necessary for the green color.
 - Observed that lack of exposure to light left covered leaves without chlorophyll and inferred that sunlight creates chlorophyll.
 - Observed that the aluminum foil reacted with sunlight bleaching the leaves and inferred that aluminum is toxic to plant leaves.
- _____ 3. You have a light microscope with four objectives. Which objective would you select first when attempting to focus on an amoeba?
- 100X
 - 400X
 - 40X
 - 1000X

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. White Cedar
- c. Juniper
- d. Balsam Fir

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 **White Pine**
 - b. Needles in bunches of two, 1-2 inches long **Red Pine**
 - 2. Needles many, more than 6, drop in autumn **Larch**
 - ii. Needles occurring singly;
 - 1. Needles blunt, flat; in flat sprays on twigs **Balsam Fir**
 - 2. Needles sharp; on all sides of twigs
 - a. Needles 4-sided, neither in opposing pairs nor in whorls of 3 **Green Spruce**
 - b. Needles 3-sided, either in opposing pairs or in whorls of 3 **Juniper**
- b. Leaves very small and scale-like, hugging twigs:
 - i. Leaves blunt; conifers **White Cedar**
 - ii. Leaves sharp; a flowering tree **Tamarisk**



5. Pharmaceutical companies often produce human insulin in bacterial cells. One of the reasons that this is undertaken is
- a. bacterial cells can be grown quickly in large quantities.
 - b. human cells in culture would develop new DNA.
 - c. bacterial and human cells are in the same taxonomic class.
 - d. human cells in culture are always viable.

- _____ 6. Topical rainforests are important to the continued development of human society for many reasons. Which is the most essential function of the rainforests for the earth as a whole?
- They provide mahogany and other tropical trees.
 - They protect indigenous, remote tribes.
 - They recycle carbon dioxide into oxygen.
 - They educate tourists and other travelers about nature.
- _____ 7. Which of the following best represents the decrease in complexity of living systems?
- molecules, tissues, cells, organs
 - cells, organs, tissues, organisms
 - organisms, tissues, cells, molecules
 - organs, cells, tissues, organisms
- _____ 8. A breeder's turtles have stopped laying eggs. She decided to put a male turtle in one of the female turtle's glass cage to see if it will increase the egg-laying rate. She also had a cage with the same conditions and number of turtles but without the male turtle. The cage without a male turtle serves
- as a control.
 - to provide additional variables for the investigation.
 - as an independent variable.
 - to let the turtles know what will happen if they don't produce.
- _____ 9. A "seedless watermelon" is sweeter, easier to eat, and has a longer shelf life than "seeded watermelons." What is the technology used to modify this watermelon plant?
- genetic engineering.
 - chemical fixation.
 - mutagenic alteration.
 - bacterial fertilizing.
- _____ 10. Which of the following hypotheses can be tested experimentally?
- It is against natural selection to prevent sexually transmitted diseases.
 - Sexual abstinence is the only morally acceptable way to prevent the spread of sexually transmitted diseases.
 - People are not meant to have multiple sexual partners.
 - Condoms are not effective in preventing sexually transmitted diseases.
- _____ 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 circulatory system because the circulatory system
- carries the food particles from the mouth to the stomach.
 - carries nutrients from the small intestine to the liver.
 - prepares the chyme for entry into the small intestine.
 - supplies digestive enzymes to large intestines.

- ___ 12. A pure breeding red-flowered plant with smooth seeds, (RRFF) is crossed to a heterozygous red-flowered plant with smooth seeds, (RrFf). What percentage of the offspring's genotype will be carriers for wrinkled seeds (f)?
- 100
 - 25
 - 50
 - 0
- ___ 13. Which of the following is an organ?
- cornea
 - kidney
 - vacuoles
 - gastric villi
- ___ 14. Your students expressed a misconception that AIDS is no longer contagious because of new medications. What is the accepted scientific view that corrects this misconception?
People with AIDS still can pass on the virus but new medications allow people to avoid
- catching sexually transmitted diseases.
 - dealing with some of the symptoms.
 - catching new cases of AIDS.
 - child-bearing transmission of AIDS.
- ___ 15. A pesticide kills 99.99% of an insect population. You would expect future generations of insects to be
- dormant until the pesticide dissipates.
 - more resistant to the pesticide than the first generation.
 - more susceptible to mutation than the first generation.
 - more susceptible to subsequent exposure to the pesticide.
- ___ 16. Diseases that involve widespread cellular infections usually result in a fever because the
- inflammatory and immune responses result in extra heat production.
 - rapid multiplication of the invading microorganisms result in extra heat production.
 - disease control center responds by creating an acidic environment favorable to all microorganisms.
 - invading cells trick the body's control center into creating a saline environment that is favorable for their growth.
- ___ 17. A tapeworm that lives off the nutrients of mammals is an example of
- parasitism.
 - competition.
 - mutualism.
 - commensalism.

- _____ 18. A foreign plant species has moved into an existing ecosystem. If the species is successful, predict the most likely effect this new population might have on the ecosystem.
- Consumers will not be affected.
 - Competition will cause a decline in native plants.
 - The new population will have a stabilizing effect on the ecosystem.
 - The new species will cross-pollinate with the native species.
- _____ 19. During a hurricane many tall grasses were uprooted and dropped in a nearby field. A neighbor offered to clear out the plants to help beautify the area. A conservation officer told him that it would be best to leave the dead grass. What is the primary reason for leaving dead grass in the field?
- The decomposition of the dead grass provides nutrients for organisms.
 - Dead grass will protect the field from the incursion of snakes.
 - The grass will eventually dry and contribute additional natural beauty to the area.
 - The dead grass will cause the old grass to die, which prevents future grass fires.
- _____ 20. While looking out the class window, you notice that some birds hop on the ground while others perch on the branches. You decide to plan an investigation to determine which types of birds spend most of their day foraging on the ground. Which scientific technique would you select to yield the best data for this investigation?
- observation of bird behavior
 - gene mapping of bird species
 - controlled experiment
 - chemical analysis of ground soil

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 noticed that since many plant stems are shaped like plant roots, 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 peony 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 peony bush. She said the ice caused the peony 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 the class that his grandfather was just diagnosed with lung cancer. He has fluid in his lungs, which he frequently coughs up. The class asks this student if he is frightened to get near his grandfather when he is coughing, because they heard that you could catch cancer germs if you do not cover your mouth properly.
- 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 class trip to the coast, your students look at the ocean and say, “This is a good example of the water cycle. The ocean water evaporates with the sun and then becomes rain over the ocean. That same water falls back into the ocean 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 national news show announced that certain cats are now being genetically engineered to be free of allergy-causing proteins. Students discuss the news and believe these genetically modified cats are dangerous.
- 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.