

**Earth/Space Science DTAMS Assessment – Version 3**  
 Diagnostic Teacher Assessments in Mathematics and Science—Middle School

Date \_\_\_\_\_ Start time \_\_\_\_\_ Finish time \_\_\_\_\_

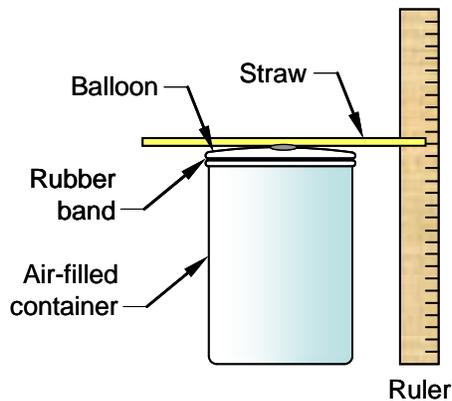
**Please provide the following information about yourself:**

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) <b>currently</b> <b>teaching</b> (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) <b>teaching certificate</b> <b>grade level(s)</b> . Mark one or more that best describes your situation.  (please describe below if "other")
Pre-K _____ K-3 _____ 4-5 _____ 6-8 _____ 9-12 _____ other _____	Pre-K _____ K-3 _____ 4-5 _____ 6-8 _____ 9-12 _____ other _____
Number of college & graduate <b>earth science courses</b> _____	Number of college & graduate <b>life science courses</b> _____
Number of college & graduate <b>physical science courses</b> _____	Sex (M/F) _____
<b>Content area of teaching certificate</b>	
<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**

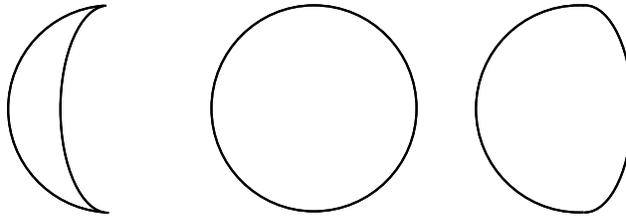
Identify the letter of the choice that best completes the statement or answers the question.

- \_\_\_ 1. The process by which sediment is laid down in a new location is called
- decomposition.
  - erosion.
  - weathering.
  - deposition.
- \_\_\_ 2. The land between two normal faults may be uplifted to form a
- hanging wall.
  - fault-block mountain.
  - syncline.
  - fold.



- \_\_\_ 3. A student constructed the apparatus above. The balloon on the top of the device will bulge upward when the
- air pressure falls.
  - humidity falls.
  - temperature of the air falls.
  - dew point falls..
- \_\_\_ 4. The earth has different seasons because
- Earth rotates on its axis exposing different sides to the sun.
  - Earth's rotation and orbit constantly change exposing different parts of Earth to different amounts of sunlight.
  - Earth is closer to the sun in summer and farther away in winter due to its elliptical orbit.
  - Earth's north pole is tilted away from the sun during half of the year, and toward it during the other half.

- \_\_\_ 5. A scientist wants to investigate the factors that are related to the prediction of weather in a certain location. The scientist records information about the clouds, air pressure, temperature, and rainfall every six hours for a week. Graphing this air pressure, temperature, rainfall and cloud cover data could assist in determining
- the processes by which air pressure and temperature interact to create changes in weather.
  - how high and low pressure systems cause changes in the weather.
  - how changes in air pressure correlate with the amount of rainfall.
  - the process by which clouds form rain.
- \_\_\_ 6. The color of a mineral's powder is called its
- hardness.
  - density.
  - streak.
  - luster.
- \_\_\_ 7. Scientists can determine the location of the epicenter of an earthquake by comparison of
- data from a seismograph and the Mercalli rating of seismic waves.
  - P and S-wave data from a single seismograph.
  - P and S-wave data from three seismographs.
  - data from a seismograph and a GPS device.
- \_\_\_ 8. Passive solar design places awnings over windows. Awnings have the greatest benefit to buildings
- at very high latitudes because awnings maximize the amount of sun entering windows when the sun is always low in the sky.
  - in the southern hemisphere because there, winter occurs when the earth is farthest from the sun.
  - near the equator because sunlight is consistently higher in intensity, creating more heat.
  - at moderate latitudes because awnings provide shade from the sun in summer and allow sunlight through the windows in winter.
- \_\_\_ 9. In the past, prior to current regulations, many open pit coal mines significantly degraded the subsequent productivity of the land because
- sedimentation ponds near the pit caused water pollution.
  - the plant nutrients provided by coal had been removed.
  - topsoil that had been removed was not replaced.
  - heavy equipment compacted the soil too much to support plant life.



Crescent

Full

Gibbous

- \_\_\_ 10. What can be concluded from the observation that Venus has crescent and gibbous, but not full, phases when viewed from Earth?
- Venus passes behind the sun.
  - Venus has an elliptical orbit.
  - Venus is closer to Earth than it is to Mars.
  - Venus is between Earth and the sun.
- \_\_\_ 11. Atmospheric pressure is greater in a valley than at the top of a nearby mountain because
- the weight of the air above the valley is greater than the air above the mountain.
  - there is more rain and humidity in the valley, which fills the air with water.
  - there is more sunshine on the top of the mountain, which removes water from the air.
  - wind blows harder through the valley pushing the air molecules closer.
- \_\_\_ 12. The increase of carbon dioxide in the atmosphere is considered to be responsible for global warming because
- it replaces the cooler nitrogen in the air.
  - ultraviolet light is absorbed by carbon dioxide and converted to heat.
  - carbon dioxide serves as a barrier to infrared radiation.
  - it creates increased cloud cover that traps the earth's heat.
- \_\_\_ 13. A student is designing a model to demonstrate the greenhouse effect. What should be the independent variable systematically varied across experimental set-ups?
- the shape of the glass enclosures
  - the temperature of the air outside each enclosure
  - the presence or absence of a glass enclosure
  - the amount of sunlight directly striking a thermometer
- \_\_\_ 14. Ocean currents have a major effect on climate because
- the movement of the water carries clouds to the land.
  - equatorial waters are non-moving.
  - glaciers keep the water near the poles at close to freezing temperatures.
  - the water stores and transfers heat.

- \_\_\_ 15. Basalt columns (an igneous rock formation) are frequently found surrounded by sedimentary rock. To determine the origin of the columns, scientists can assume, based on the principle of uniformitarianism, that
- when the rocks were formed, the same processes created both sedimentary and volcanic rock.
  - in the past, basalt rock only formed deep under the sea.
  - the basalt was formed by the same kind of processes that are found in volcanic areas today.
  - they can never know how rocks could have been formed in prehistoric times.
- \_\_\_ 16. Which of the following planets can be described as relatively large and gaseous?
- Saturn
  - Mars
  - Pluto
  - Venus
- \_\_\_ 17. Paleontological investigations are non-experimental because, for example, the age of a sample cannot be controlled. Which method overcomes this limitation?
- principle of biostratigraphy
  - radiometric dating
  - principle of superposition
  - faunal succession
- \_\_\_ 18. In which type of cloud does hail form?
- nimbostratus
  - cumulonimbus
  - cirrocumulus
  - cirrus
- \_\_\_ 19. The rock cycle is a model that shows how one type of rock can be transformed into another. Which of the processes below is the first step for transforming igneous rock into sedimentary rock?
- melting
  - high pressure
  - weathering
  - extrusion
- \_\_\_ 20. A geologist needs to identify a rock sample as part of an investigation. Knowing the sample's specific gravity is useful because that
- determines where the sample would be deposited.
  - determines the hardness of the sample.
  - is a property of rocks that uniquely identifies them.
  - is a property of rocks that can narrow the set of potential identifications.

### **Open Response Directions**

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 lesson, textbook, activity, piece of equipment, or media, assume the reader is not familiar with it and explain how it is used to support student learning. Assume you have access to any equipment that would be available in a reasonably well-funded K-12 school setting so that your proposed instruction is feasible to implement.*

21. Your students assume that the presence of large geographic features such as mountain ranges and canyons are evidence that “the forces acting on the earth were different back when mountains were formed.”
- (a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. (See directions at 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 beginning of the open response section for more detailed directions.)

22. Your students explain that the water cycle changes direction at night, moving fresh water from the lake back to the ocean because the coastal breezes blow off-shore in the evening.

(a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. (See directions at 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 beginning of the open response section for more detailed directions.)

23. Your students do **not** believe that continents can move because “solid rock can’t float.”
- (a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. (See directions at 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 beginning of the open response section for more detailed directions.)

24. Your students believe that the full moon causes high tides and the new moon causes low tides.
- (a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. (See directions at 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 beginning of the open response section for more detailed directions.)

25. Your students say that the moon appears full when it is closer to the Earth; and when it is farther away, it is in a crescent phase.

(a) Please describe the currently accepted scientific explanation of the phenomenon that the students are not understanding. (See directions at 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 beginning of the open response section for more detailed directions.)