

Earth/Space Science DTAMS Assessment – Version 2
 Diagnostic Teacher Assessments in Mathematics and Science—Middle School

Date _____ Start time _____ Finish time _____

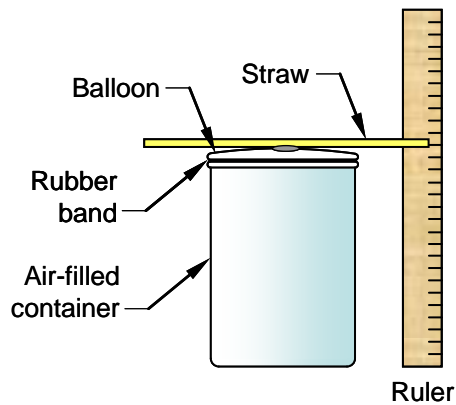
Please provide the following information about yourself:

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>

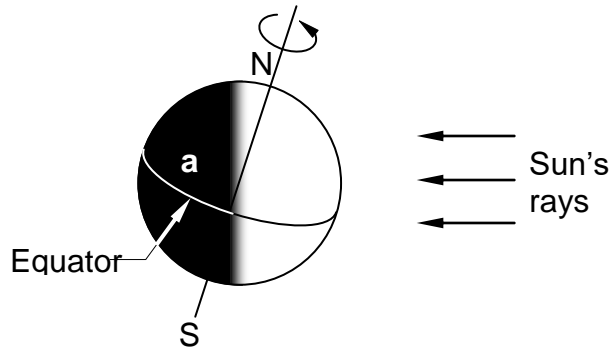
Multiple Choice

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

- ___ 1. The break up of rock into small pieces by natural forces is called
- weathering.
 - glaciation.
 - metamorphosis.
 - erosion.
- ___ 2. It is widely accepted that the movement of Earth's plates is caused by
- subduction of land forms.
 - the Earth's magnetic field.
 - tidal forces.
 - convection currents in the aesthenosphere.



- ___ 3. A student constructed the above apparatus with a flexible balloon sealing the top of an air-filled, metal canister. A straw pointer was attached to the top of the balloon, and a ruler placed at one unattached end of the straw. The next day the student observed that the tip of the straw had moved up. From this evidence, the student can conclude the air pressure is
- rising and weather is likely to be cloudy or stormy.
 - rising and weather is likely to be fair.
 - falling and weather is likely to be cloudy or stormy.
 - falling and weather is likely to be fair.



4. The season of the year at point “a” on the diagram of the Earth above is
- fall.
 - summer.
 - winter.
 - spring.
5. A scientist wants to investigate factors that are related to the prediction of the local weather. Barometric pressure is measured every six hours and recorded. Cloud cover is observed and recorded next to the pressure on the chart. What other measurement would add useful information to the procedure?
- latitude
 - average rainfall
 - temperature
 - altitude
6. When determining the cleavage of a mineral, you are determining how it
- develops.
 - streaks.
 - splits apart.
 - shines.
7. What does a seismograph record?
- the speed of seismic waves
 - the structural damage caused by seismic waves
 - the ground movements caused by seismic waves
 - the Mercalli scale rating of seismic waves
8. In North America, awnings over windows help keep a house cool in the summer and warm in the winter because the sun is
- closer to the earth in the summer than in the winter.
 - hotter in the summer than in the winter.
 - up for a greater length of time in the summer than winter.
 - higher in the sky in summer and lower in the sky in winter.

- ___ 9. Seams of coal that are found far below the surface of the earth are
- good prospects for open pit mining.
 - of higher quality than those near the surface.
 - usually not economically feasible to surface mine.
 - usually thicker than those near the surface.
- ___ 10. The observation that the sun and the moon appear to be the same size in the sky does not by itself indicate anything about their relative sizes. What other evidence is useful in determining which is larger?
- The moon passes in front of the sun during a solar eclipse.
 - The sun warms the Earth and the moon doesn't.
 - The Earth passes between the moon and the sun during a lunar eclipse.
 - The moon causes the Earth's tides.
- ___ 11. The earth's atmosphere seems to hug the surface of the planet. Why do those gases stay close to the earth?
- Cosmic radiation pressure from the sun holds the atmosphere in place.
 - Temperature variations on the earth's surface produce wind that keeps the air circulating near the earth.
 - The gravitational attraction between the earth and the atmosphere holds atmosphere to the earth.
 - The centrifugal force of the spinning earth creates wind that holds the atmosphere to the earth.
- ___ 12. The ozone layer of the atmosphere serves as a shield absorbing most of the ultraviolet radiation found in the sun's rays. Which form of pollution degrades the ozone layer?
- Methane from grazing cattle.
 - Sulfuric acid from burning bituminous coal.
 - Carbon dioxide from burning hydrocarbons.
 - Chlorofluorocarbons from air conditioners.
- ___ 13. A student designs an experiment to measure dew-point. Warm water is placed in a container. Ice-cold water is added in increments until condensation appears on the container's outer surface. Which container material would produce the best results?
- Styrofoam, because it best insulates warm water.
 - Metal, because it has high heat conductivity.
 - Ceramic, because it doesn't expand or contract significantly when it changes temperature.
 - Glass, because the water is visible through transparent material.

- ___ 14. A prevailing wind blows from an ocean across a mountain from west to east. In most cases, the land on the west side of the mountain will be
- drier than the land on the east side.
 - dry in winter and wet in summer.
 - more green and lush than the land on the east side.
 - equally as humid or dry as the east side.
- ___ 15. A weakness of paleontological investigations is that they are non-experimental because they cannot control variables. This weakness is lessened by the assumption of uniformitarianism because
- scientists assume that the same set of circumstances explains all paleontological observations.
 - fossils are found in the same environment in which they were deposited.
 - anatomical structures have not changed, so scientists can compare fossils with modern bones.
 - scientists can experiment in the present and presume that the same findings would hold for points in the geologic past.
- ___ 16. Which of the following planets can be described as relatively small and rocky?
- Jupiter
 - Neptune
 - Mercury
 - Uranus
- ___ 17. Paleontological investigations often rely on radiometric dating techniques to establish the age of their samples. This technique is reliable because it
- is based on index fossils whose dates were assigned long before radioactivity was discovered.
 - can be done by computers attached to Geiger counters so that human error is not a factor.
 - is based on the half-lives of isotopes, which have been found to be constant over time.
 - consistently produces the same age for all samples in a particular geographic region.
- ___ 18. Clouds that are high up in the sky and made of ice crystals are
- nimbostratus.
 - cirrus.
 - stratus.
 - cumulus.
- ___ 19. Weathering is a necessary part of the rock cycle because
- weathering converts rock from one type to another over a long period of time.
 - weathering provides raw materials for sedimentary rock formation.
 - metamorphic rock is formed from the particles created by erosion.
 - without weathering igneous rock could never form.

- _____ 20. A geologist measures the specific gravity of a mineral sample. Which next step would best aide in the identification of the sample?
- Measure the weight and volume of the sample of mineral.
 - Repeat the measurement in an area with a different gravitational force.
 - Scratch the mineral sample with a diamond stylus.
 - Expose the mineral to ultraviolet light.
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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. After examining a photograph of folded rock layers, your students exclaim that when the rocks were folded back in ancient times, geologic forces must have been much stronger than they are currently because rocks can't be folded like that now.
- (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 assert that the source of every river is a spring where water bubbles out of the ground.
- (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 believe that the all of the interior of the earth is solid rock.
- (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 explain that the reason there are high and low tides is because waves push water first to the west and then to the east.

(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 assert that the moon has a hemisphere that is always in shadow called “the dark side.”
- (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.)