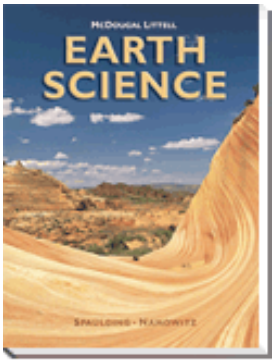
Alternative Assessment Answer Key

McDougal Littell

EARTH SCIENCE



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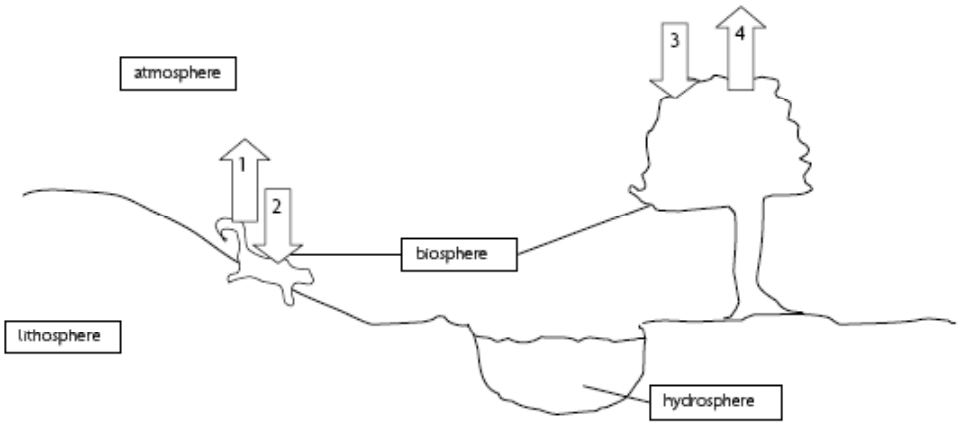
Chapter 1 Alternative Assessment

Oxygen in the Earth System

1. Diagrams may be abstract or representational as long as they indicate all four spheres of the Earth system. The following connections can be made after reading chapter 1; additional connections could be added after reading Chapter 17 (p. 367) and Chapter 29 (p. 657).

1. The atmosphere contains oxygen (O_2).
2. atmosphere to biosphere: Animals take in oxygen (O_2) from the atmosphere.
3. biosphere to atmosphere: Animals release carbon dioxide (CO_2) as a product of respiration.
4. atmosphere to biosphere: Plants take in CO_2 for photosynthesis.
5. biosphere to atmosphere: Plants release O_2 as a product of photosynthesis.

Sample Diagram

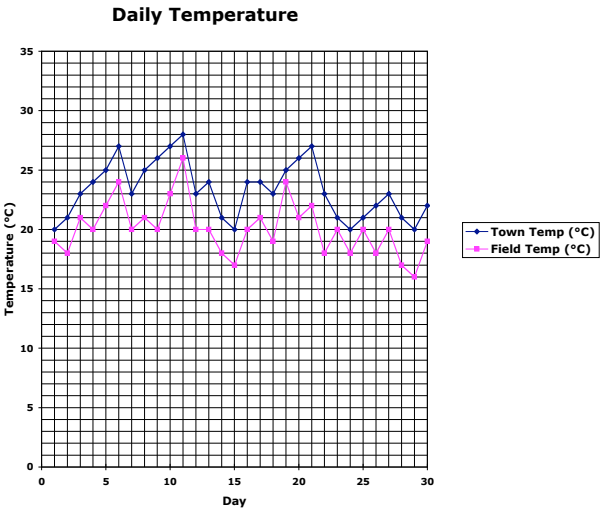


2. Sample answers: deforestation would cut down on the amount of oxygen released into the atmosphere; increased burning of fossil fuels would add more carbon dioxide to the atmosphere.

3. The Earth system is considered a closed system. Energy enters the system from the Sun and energy is reflected back into space, but little material moves into or out of the Earth system.

Chapter 2 Alternative Assessment
Student Fieldwork

Sample Graph



Questions

1. The student predicted that the average daily air temperature in town would be cooler than the average daily temperature outside of town. The student did not make a complete hypothesis indicating a tentative explanation or reason for the predicted results.

2. Temperature was an uncontrolled variable. The location and time of the measurement were variables controlled by the student.

3. The thermometer used in the measurements was the same.

4. Town average temperature = 23.3 °C
   Field average temperature = 20.1 °C

5. Town high temperature = 28 °C
   Town low temperature = 20 °C
   Field high temperature = 26 °C
   Field low temperature = 16 °C

Chapter 3 Alternative Assessment
Map Projections

1. Name — Mercator Projection
   When useful — For navigation: shows true directions as straight lines; can see the whole world on one map
   Distortions — Distorts sizes of areas near the poles

2. Name — Gnomonic Projection (Planar)
   When useful — Planning travel: shows accurate distances; useful for showing the poles
   Distortions — Distorts shapes of land and water away from the center of the map

3. Name — Polyconic Projection (Conic)
   When useful — Mapping sections of Earth close to equator
   Distortions — Distorts areas near the poles

Chapter 4 Alternative Assessment
Earth's Motion around the Sun

Position 1

1. Season Winter
2. Date December 21
3. Parallel the Tropic of Capricorn

Position 2

1. Season Spring
2. Date March 21
3. Parallel the equator

Position 3

1. Season Summer
2. Date June 21
3. Parallel the Tropic of Cancer

Position 4

1. Season Autumn
2. Date September 22
3. Parallel the equator

Questions

1. The Earth is tilted 23.5 On the first day of summer, the North Pole is tilted 23.5 towards the direction of the Sun. As Earth spins once around the axis centered on the North Pole, it never leaves the path of the Sun's rays. Instead of rising or setting, the Sun circles in the sky. On the first day of winter, the North Pole is tilted 23.5 away from the direction of the Sun, so it is not in the path of the Sun's rays.
2. Earth's perihelion and aphelion have minimal affect on the seasons. At perihelion, Earth's point nearest the Sun, Earth is about 147.6 million km away from the Sun. At aphelion, Earth's farthest point from the Sun, Earth is about 152.4 million km away from the Sun. Since these two distances are relatively similar, Earth's seasons are not significantly affected by distance from the Sun.

Chapter 5 Alternative Assessment

Mineral Identification

Sample Table

When providing students with the mineral samples, identify the minerals, but do not say which sample (1, 2, or 3) corresponds to which mineral. You may wish to add the names of some minerals not present to give the students a more challenging exercise. Make clear to students that many of their responses will need to be approximations only. For instance, they will need to consult a reference to determine the exact values for properties such as hardness. Suggest that they first compare the samples to one another (which is harder, which lighter, etc.) and then use a reference to determine which sample best corresponds to the characteristics of their choices. The table "Properties of Some Common Minerals," on pp. 700–701 contains information on a variety of common minerals.

The table below shows the expected results for three common minerals. Students' responses will differ based upon the minerals they received for testing.

Sample	Color	Luster	Hardness	Streak	Cleavage or Fracture	Mineral Name
1	Silver gray to black	Dull	1 to 2 (soft)	Grayish black	C	Graphite
2	Dark or light	Glassy/reflective	7 (hard)	No streak	F	Quartz
3	White, green, gray	Nonmetallic (greasy feel)	1 (very soft)	No streak	C	Talc

Questions

1. Students may say that the color test was the least useful, as the colors of the samples may be very similar or not easily recognizable. Accept all reasonable responses.
2. The number 1 refers to the softest mineral on the Mohs' scale.
3. The name of the softest mineral on the Mohs' scale is talc.
4. The number 10 refers to the hardest mineral on the Mohs' scale.
5. The name of the hardest mineral on the Mohs' scale is diamond.

Chapter 6 Alternative Assessment

Estimating Composition

Expect that students may have difficulty in distinguishing among some of the minerals in the key, especially between biotite mica and olivine. Accept all reasonable responses. The purpose of the exercise is to test the student's ability to recognize patterns and compare. Exact percentages may be approximated, but students should be able to distinguish between a low and a high percent composition. You may allow some students to simply note percent composition as being *low, high, or none*. Allow for total percent composition values to be too low but not too high (over 100%). For additional assistance, refer students to the Lab Activity on pages 138–139 in the book.

Sample A

1. Rock Family: Igneous. The grains are larger and show an interlocking pattern.

2. The percent composition of each mineral

Orthoclase Feldspar: 0% (none)
Plagioclase Feldspar: 20% (low)
Quartz: 5% (low)
Biotite Mica: 5% (low)
Olivine: 5% (low)
Amphibole: 10% (low)
Pyroxene: 10% (low)
Calcite: 0% (none)

Sample B

1. Rock Family: Sedimentary. The grains are rounded and close together.

2. The percent composition of each mineral

Orthoclase Feldspar: 10% (low)
Plagioclase Feldspar: 0% (none)
Quartz: 90% (high)
Biotite Mica: 0% (none)
Olivine: 0% (none)
Amphibole: 0% (none)
Pyroxene: 0% (none)
Calcite: 0% (none)

Sample C

1. Rock Family: Metamorphic. The grains show a linear pattern.
2. The percent composition of each mineral

Orthoclase Feldspar: 10% (low)
Plagioclase Feldspar: 5% (low)
Quartz: 20% (low)
Biotite Mica: 0% (none)
Olivine: 10% (low)
Amphibole: 10% (low)
Pyroxene: 10% (low)
Calcite: 0% (none)

Questions

1. Sample A: The grains are larger and interlocking.
2. Sample B: Smaller crystals packed closely together.
3. Sample C: A linear pattern

Chapter 7 Alternative Assessment
The Costs of Electricity

Sample Chart

Method	1. R/NR	2. Necessary Features	3. Benefits	4. Drawbacks
Coal	NR	mines, coal deposits	relatively inexpensive	causes air pollution and acid rain, destroys the land
Nuclear	NR	uranium isotope, nuclear reactor	no air pollution	toxic waste must be stored and handled carefully
Wind	R	large land area, strong and steady winds, windmills	renewable, nonpolluting	Interferes with bird migration, no energy storage solution
Oil	NR	oil-bearing rock, drills	relatively inexpensive	causes pollution, oil spills, damages wildlife habitat
Solar	R	sunny weather, warm climate, solar collector or solar cells	renewable, clean	no energy storage solution, not reliable
Geothermal	R	area of volcanic activity, hot rock	renewable	cave-ins, mineral rich water could harm environment
Hydroelectric	R	flowing water or oceans with tides, dams	clean, renewable	few available sites, alters the aquatic habitat

Question
Answers will vary. Answers should include properly supported recommendations.

Chapter 8 Alternative Assessment
Ocean Floor Patterns

1. Students should draw arrows from the middle toward the edges of the diagram.
2. One possible plate boundary is a convergent boundary with ocean/continent subduction. This type of boundary occurs when an oceanic plate plunges beneath a continental plate. Another possible plate boundary is a convergent boundary with ocean/ocean subduction. This type of boundary occurs when an oceanic plate plunges beneath another oceanic plate.

   Side-view diagrams should include the following:

   Convergent boundary with ocean/continent subduction: deep sea trench, mountain chain with volcanoes.

   Convergent boundary with ocean/ocean subduction: deep sea trench, chain of volcanic islands.
3. Students' systems and keys will vary, but students should indicate that the first stripe to the left of the Mid-Ocean Ridge is the same age as the first stripe to the right of the Mid-Ocean Ridge, the second stripe to the left of the ridge is the same age as the second strip to the right of the ridge, etc.
4. Sample answer: Mantle convection can be thought of as a conveyor belt. The convection currents cause the mantle to act as a conveyor belt moving the plates. Ridge push can be thought of as a cart sliding down a hill. The molten magma forms rocks that rise to the top of a hill and then roll down the hill. Slab pull can be thought of as a jacket that falls off of a table once keys are placed in a pocket that is hanging off the edge of a table.

Chapter 9 Alternative Assessment
Characteristics of Volcanoes

Volcano A This is a volcano formed near a subduction boundary.

1. Magma — andesitic magma; about 60% silica content; formed by an increase in the amount of water in the astheosphere, which lowers the melting temperatures of materials.
2. Landform — composite volcano; shaped like a rocky mountain; formed by layers of material accumulating from many explosions
3. Eruption — explosive; magma, water, and gases explode with superheated ash and stones

Volcano B This is a volcano formed over an oceanic hot spot.

1. Magma — basalitic magma; about 50% silica content; formed when plumes of hot solid material rise from deep within the mantle
2. Landform — shield volcano; shaped liked a broad base with gently sloping sides
3. Eruption — does not explode; emits lava flows that are frequent and large

Volcano C This is a volcano formed at a divergent boundary.

1. Magma — basalitic magma; about 50% silica content; forms when a decrease in pressure lowers the melting temperatures
2. Landform: — mid-ocean ridge (underwater)
3. Eruption — continues, long-term eruption; forms pillow lava

Chapter 10 Alternative Assessment
Information from Earthquake Waves

1. Both graphs show P-waves. Since the first graph shows a sharp decrease in velocity, it indicates that the waves are traveling through liquid. S-waves cannot travel through liquids, so the continuation of the first graph after the large velocity decrease indicates that both waves are P-waves. If students have difficulty answering this question, recommend that they answer the second question first.

2. The first graph shows the boundary of the mantle and the outer core. As P-waves leave the dense mantle and enter the less dense liquid outer core, they slow dramatically. The second graph shows the boundary of the Moho. As waves leave the less dense rock of the crust for the more dense rock of the mantle, their velocity increases.

3. If the waves were S-waves, the first graph would abruptly stop at the point where the vertical line currently is. This is because S-waves cannot travel through the liquid outer core. Also, S-waves travel at roughly half the velocity of P-waves, so both graphs would have roughly half the velocity compared to the velocity shown on the graph.

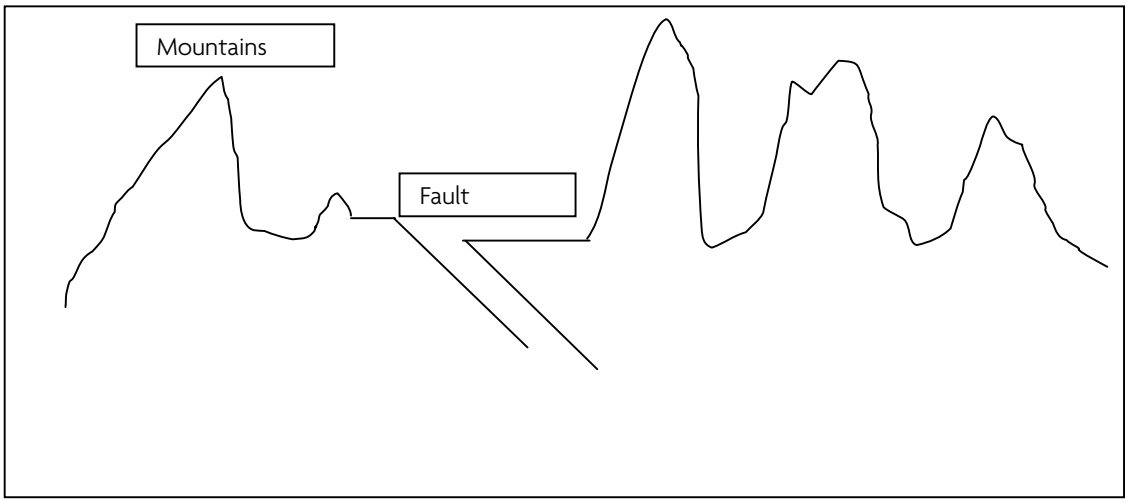
Chapter 11 Alternative Assessment
Interpreting Geologic Cross-sections

1. This is an example of a normal fault. The hanging wall (the portion to the right in illustration) is below the footwall.

2. Folding occurs when stress squeezes inward or compresses the rock layers (i.e., compression stress). The fault must have occurred after the compression, as the two sides of fault plane appear to have matching stress patterns and so would seem to have been made at the same time.

3. Accept student answers that identify a mountain range as a possible larger geographical picture that the blocks and fault might be a part of. Should students be concerned about drawing a figure, encourage them to find a photograph of a mountain range they know folding to have produced (the Appalachians are one example).

Sample Diagram



Chapter 12 Alternative Assessment
Changing Earth's Surface with Water

Weathering Water plays a role in several types of weathering. When water in the cracks between rocks freezes, it expands and pushes the rocks apart (frost wedging). The repeated wetting and drying of rocks can also cause rocks to break apart. When water moves rocks along streambeds, these rocks scrape against each other and wear away the bottom of the streambed (abrasion). Finally, during chemical weathering, certain minerals dissolve in water and can react to form different (clay) minerals.

Soil formation Soils form when parent material is weathered away. Water plays a key role in several types of weathering. These weathering processes break down the parent material (rock), which combines with organic material (decaying plant and animal matter) to form soil. Some soils (transported soils) form when water carries parent materials and deposits them in new places.

Mass movements Water plays a role in several types of mass movement. Water is one of the causes of creep, which is the very slow movement of soil down a slope. During an earthflow, weathered material that has been soaked (saturated) with water flows downhill. Finally, water that contains a lot of clay and silt can flow rapidly downhill during a mudflow.

Erosion Water plays a role in erosion by removing earth materials (rocks) and transporting them to different places. This process wears away the area that is being eroded.

Shaping landforms Water is one cause of the erosion of landforms. Erosion wears away and causes landforms to be smooth and rounded. Water transports eroded materials and deposits them in different places, building up the landforms in these new places.

Chapter 13 Alternative Assessment

River Flow Graphs

Velocity vs. Suspended Sediment Size Graph should show the size of suspended sediment increasing as velocity increases. **Explanation:** A fast-moving (high velocity) river has more energy and can therefore carry larger particles than a slow-moving (low velocity) river.

Gradient vs. Velocity Graph should show the velocity increasing as the gradient increases. **Explanation:** The gradient of a river is the steepness of the slope. The steeper the slope, the faster the river will flow (higher velocity).

Distance from Mouth vs. Deposited Sediment Size Graph should show the size of deposited sediments increasing as the distance from the river mouth increases. **Explanation:** A river's velocity decreases as it approaches its mouth, where it empties into another body of water. As the velocity decreases, the size of sediments that it deposits gets smaller and smaller because the river is losing energy. Therefore, the deposited sediment size is smallest at the mouth of the river (where the velocity is lowest); larger sediments are deposited farther away from the mouth (where the velocity is higher).

Time of Year vs. Discharge Graph should show the highest discharge in the spring and summer, with lower discharge in the fall and winter. **Explanation:** A river's discharge is the amount of water that passes a certain point in the river in a certain amount of time. More water runs into a river during rainy seasons and when snow melts. The directions say to assume a rainy summer season and significant winter snow. Therefore, the discharge is highest in the spring and summer, and lower in the fall and winter.

Chapter 14 Alternative Assessment

Characteristics of Aquifers

Sample Chart Entries

Material 1 This material is likely made up of large particles (which explains the high permeability) that are rounded and well-sorted (which explains the high porosity).

Material 2 This material is likely made up of small particles (which explains the low permeability) that are rounded and well-sorted (which explains the high porosity).

Material 3 This material is likely made up of small particles (which explains the low permeability) that are angular and poorly-sorted (which explains the low porosity).

Material 4 This material is likely made up of large particles (which explains the high permeability) that are angular and poorly-sorted (which explains the low porosity).

Questions

1. Material 1 would make the best aquifer because it has a high porosity and a high permeability. High porosity allows a layer of rock to hold a lot of water and a high permeability allows the water to pass through the rock easily. For an aquifer to supply a well, there must be enough water and the water must be able to move through the rock.

2. Materials with low porosity and low permeability are important to groundwater because they keep groundwater from sinking farther into the Earth. These impermeable layers of rock form the base of aquifers; water fills the empty space (pore space) above them. In this way, impermeable/nonporous layers create a sort of underground container for aquifers.

Chapter 15 Alternative Assessment

Glacier Dynamics

1900–1925 At first the glacier is remaining stationary, meaning that the rate of movement equals the rate of melting. Then the glacier begins advancing slowly, which means that the rate of movement is slightly greater than the rate of melting. A series of winters with heavy snows likely caused this greater rate of movement (advancement).

1925–1950 The glacier is advancing more quickly than in the previous 25-year period, which means that the rate of movement is much greater than the rate of melting. There was likely a series of winters with very heavy snows that caused this greater rate of movement (advancement).

1950–1975 The glacier advances to its farthest point from the source and then it begins retreating very quickly. When it is retreating, the rate of melting is greater than the rate of movement. Several warm summers likely caused this increased rate of melting (retreat).

1975–2000 The glacier begins to retreat more slowly during this period, meaning that the rate of melting is still greater than the rate of movement but it is slowing down. There was likely a series of warm summers during this time, but towards the end of the 25-year period the summers were likely not as warm and there were likely some winters with more snow.

Chapter 16 Alternative Assessment

Changing Shorelines

1. The change shown in the diagram is that an area that was once a land is now covered by water; the shoreline has been pushed back. This change was most likely caused by erosion due to wave action, since this stretch of shoreline jutted out into the open water (called a headland). Students may also mention refraction, which causes the wave to approach the shoreline head-on. If students wrote that the change in shape could have been caused by a rise in sea level, this answer should also be accepted. It is possible that the stretch of shoreline that was pushed back was of lower elevation than the adjacent shoreline, which explains why the adjacent shoreline did not change in shape during this time.

2. Accept all reasonable sketches. Some students may assume that the waves will continue to erode the shoreline. In this scenario, the shoreline will become more regular (relatively straight) as the waves erode away the headlands. Another possible scenario would be a rise in sea level. If this happens (assuming the coastline is a uniform elevation), the shoreline would be pushed back uniformly.

3. Accept all responses that contain a reasonable explanation. If students assume that the shoreline has a uniform elevation, the shoreline would be pushed back uniformly with a rise in sea level, since the seawater would flood the land. If students assume that the stretch of shoreline that changed in the past has a lower elevation than the adjacent shoreline, a rise in sea level would cause this stretch of shoreline to be pushed back.

Chapter 17 Alternative Assessment
Pollution and the Atmosphere

1. After the Clean Air Act of 1970, the amount of sulfur oxides and volatile organic compounds decreased. The amount of nitrogen oxides increased.
2. Answers will vary. Sample answers:
   a) pollutant = CO (carbon monoxide)
   possible reason for the observed change = Carbon monoxide levels might have decreased from 1970 to 1997 because automobile exhaust systems have become more efficient. Also, the government began to require emission testing of vehicles.
   b) pollutant = NO_2 (nitrogen dioxide, nitrogen oxides)
   possible reason for the observed change = Nitrogen oxide levels might have increased because although cars became more efficient in their use of fossil fuels, there are now more cars on the roads.
   c) pollutant = SO_2 (sulfur dioxide, sulfur oxides)
   possible reason for the observed change = Sulfur oxide levels might have decreased because the power plants, oil refineries, and paper mills have changed their processes to comply with the Clean Air Act of 1970.
   d) pollutant = Pb (lead)
   possible reason for the observed change = The amount of lead emissions may have decreased because the major sources of lead, smelters (tools used to melt metal) and battery plants, are no longer as prevalent in the United States as they once were.

Chapter 18 Alternative Assessment
Interpreting Atmospheric Measurements

1. All graphs show that temperature decreases as altitude increases.

2. In general, the dew point temperature decreases as altitude increases.

3. According to the graphs, the dew point is always below the temperature. The number of degrees Celsius below it is may vary, but dew point is always at or below temperature of the air.

4. In each city, clouds would most likely form at these altitudes (Students need not convert values into feet)
   Green Bay, Wisconsin: No clouds will form
   Rapid City, South Dakota: 7540 m
   Lincoln, Illinois: No clouds will form

5. Green Bay, Wisconsin, had a wet air mass close to the ground and a much dryer air mass higher in the atmosphere. This is evident in how far below the dew point is to the actual temperature from 2500m to 10000m of altitude. If students select another city, point out that no other has a larger difference between dew point and temperature than does Green Bay.

Chapter 19 Alternative Assessment
Isobaric Map

1. Allow students latitude in drawing the isobars on the map. Check maps for details such as if the lines intersect or if a line of a certain pressure crosses a point indicating a different pressure. In general, maps should show two low-pressure areas: one in Tennessee, the other in Nevada. A high-pressure area appears in South Dakota.

2. Students should place an "L" near the low-pressure area in Tennessee and one near the low-pressure area in Nevada.

3. Students should place an "H" near the high-pressure area in South Dakota.

4. Arrows should indicate the winds moving from the high-pressure center out towards the surrounding lower-pressure area. The Coriolis effect causes the winds to turn towards the right.

5. Arrows should indicate the winds moving away towards the low-pressure center from the higher-pressure surroundings. The Coriolis effect causes the winds to turn towards the right.

6. Due to the Coriolis effect, all weather moves towards the east. In general, all the air masses will move towards the east.

Chapter 20 Alternative Assessment
Air Masses and Fronts

1. Students should mark the line to the left as a cold front, using the triangles. The line to the right, the warm front, should be marked with semicircles.

2. The mT should go in upper portion of the map. The cP should go in the lower portion of the map.

3. The source region for the air mass at point A comes from the poles.

4. The source region for the air mass at point B comes from the tropics.

5. The symbol for the thunderstorm should be placed at point C. This is where the occluded front forms.

6. Cumulus clouds will form. These clouds bring storms.

7. Area B will likely have clear skies, as it will be behind the advancing cold front.

Chapter 21 Alternative Assessment

Climate Comparisons

This exercise evaluates students' understanding of the factors affecting climate. While some reasons may be obvious, the differences in climate between certain cities may not be so clear-cut. Accept all reasonable answers.

1. Bismarck and Abilene
   Temperature range
   Bismarck, circle *lower*
   Abilene, circle *higher*
   Reasons for difference: Bismarck has a lower temperature range, because it is at a higher latitude.

2. El Paso and New Orleans
   Temperature range
   El Paso, circle *higher*
   New Orleans, circle *lower*
   Reasons for difference: New Orleans is a coastal city and so has milder temperatures.

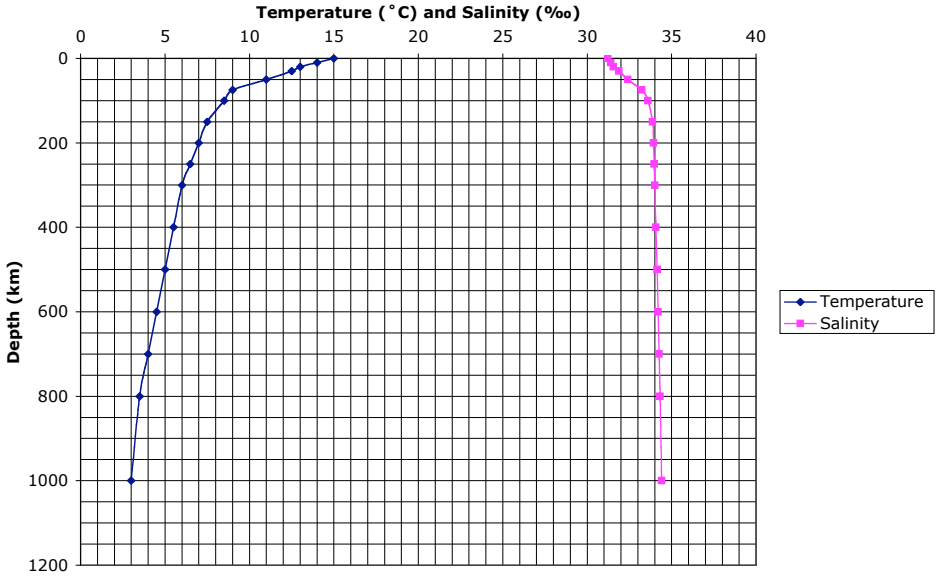
3. El Paso and New Orleans
   Rainfall
   El Paso, circle *lower*
   New Orleans, circle *higher*
   Reasons for difference: Large bodies of water add precipitation to the atmosphere, which leads to greater rainfall.

4. Rapid City and Buffalo
   Temperature range
   Rapid City, *same*
   Buffalo, *same*
   Reason for difference: These two cities are at about the same latitude and one is not at a much greater altitude than the other. Buffalo's temperature may be more moderate from having the lake near it, but the cities are probably very close.

5. Rapid City and Buffalo
   Rainfall
   Rapid City, *lower*
   Buffalo, *higher*
   Reason for difference: Being near lake Erie, the air around Buffalo will have much more precipitation.

Chapter 22 Alternative Assessment
Temperature, Salinity and Depth

Sample Graph



1. Temperature decreases with depth in ocean because almost all the energy that heats the oceans comes from the sun, and solar heat does not penetrate very deeply into the oceans. Most of the heat from solar energy is absorbed in the first few meters of seawater.

2. In this graph, salinity increases as you move deeper into the ocean. Accept all reasonable explanations for this pattern. One possible explanation is that this sample area (off the coast of California) has high precipitation, which dilutes the salinity near the surface. The cooler, deeper water does not mix well with the surface water, so the salinity increases with depth.

3. The coldest water in the ocean is at the bottom of the ocean. The water with the highest salinity where this sample was taken is also at the bottom of the ocean. However, if students were to consider *all* ocean water, they may write that the most saline ocean water is found in hot, dry climates (where water evaporates rapidly and leaves salts behind) or in polar waters (where freshwater ice forms and leaves salts behind).

Chapter 23 Alternative Assessment
Mapping the Ocean Floor

Contour Map: The -1000 meter contour line is a nearly vertical line running roughly parallel with the coast. This is followed by a series of lines (-2000 through -9000 meters) that are very close together, indicating a steep drop-off (trench). Contour lines -7000, -8000, and -9000 form a ring around this trench. As you move farther out into the ocean, a series of contour lines (-6000 through -3000) form a concentric circle, indicating a seamount. There is another -6000 contour line beyond the seamount, indicating the beginning of the mid-ocean ridge (note that some students may be confused by the fact that there are two adjacent –6000 meter contour marks). This is followed by contour lines at –5000, –4000, and –3000 meters.

1. A. **Feature**: continental shelf **Depth**: Accept anything between 10 and 300 meters
   B. **Feature**: trench **Depth**: Accept anything between 8000 and 9250 meters
   C. **Feature**: abyssal plain **Depth**: Accept anything between 6000 and 7000 meters
   D. **Feature**: seamount **Depth**: Accept anything between 2900 and 6000
   E. Feature: mid-ocean ridge **Depth**: Accept anything between 2000 and 4000 meters
2. echo sounding; also accept sonar
3. During echo sounding (sonar), a special device called a precision depth recorder sends a sound signal through the water to the sea floor. By tracking how long it takes for the signal to reach the bottom and echo back to the ship, scientists can measure the water'
4. The continental margin shown is active.
5. You can tell that it is an active margin because it has a steep continental slope (indicated by the contour lines that are very close together), which falls into a deep trench.
6. The greatest changes in slope (indicated by contour lines that are very close together) take place where the continental shelf/slope drops off into the trench, and also at the seamont.
7. Sea-floor spreading occurs at mid-ocean ridges.
8. seamount
9. B; Coldest water is found at the deepest depths. On this map, the deepest depths occur in the trench, near letter B.
10. Accept all answers that have reasonable explanation. If this map is of a geographic region with high rainfall, the least saline water may be found in the most shallow waters (A). If this map is in a hot, dry region or in polar waters (where ice forms at the surface), the least saline water may be at the greatest depths (B).

Chapter 24 Alternative Assessment
Time and Tide

1. 12:25 A.M. and 12:35 P.M.
2. 6:11 A.M. or 6:49 P.M.
3. 2:07 A.M. and 2:18 P.M.
4. 4:29 A.M. and 5:13 P.M.
5. Wolcott Avenue
6. Wolcott Avenue
7. earlier, because the moon rises 50 minutes later each day, so the tide is about 50 minutes later each day.
8. The second high tide occurs just after midnight, so it's on November 4th instead of on November 3rd.
9. The shoreline does not change very much along the East River.

Chapter 25 Alternative Assessment

Phases of the Moon

1. position 1: new moon; position 3: first quarter; position 6: waning gibbous
2. position E: midnight; position G: dawn (about 6 A.M.); position B: afternoon (about 3 P.M.)
3. waning gibbous, third quarter, waning crescent
4. 1 (new moon)
5. On a solstice, either the light or dark portion of Earth would be greater than half. The edge of the shading would hit one edge of the Arctic Circle.
6. waning crescent

Chapter 26 Alternative Assessment

The Men Who Made the Model

1. Ptolemy. Ptolemy would say this, because he placed the Earth at the center of everything and had all other things move about it.
2. Copernicus. Copernicus put the Sun at the center of everything.
3. Tycho. Tycho would make this statement, because he spent his entire career making precise observations of the heavens.
4. Kepler. Kepler would say this, because he was the scientist who made the bold move of putting planets into elliptical orbits.
5. Newton. Newton would have made a statement like this, because he showed how gravity and inertia could explain the orbits of planets around the Sun.

Chapter 27 Alternative Assessment

Scale-Model Solar System

1. 24.6 cm
2. 18.7 cm
3. 12.0 cm
4. 5.9 cm
5. The scale is too small. The other planets would be so close together that the x drawn for each planet would overlap the others.
6. At this scale, the diameter of each planet is too small to draw.

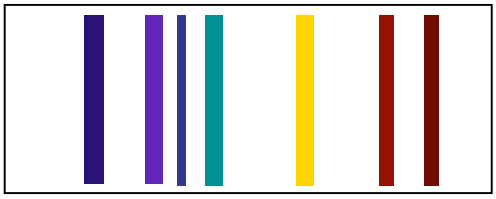
Chapter 28 Alternative Assessment

Identifying Light Sources

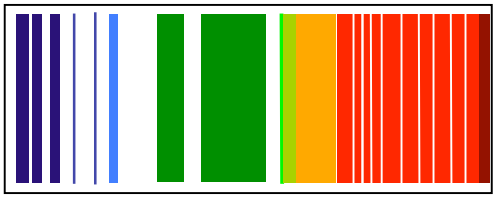
Student answers will depend upon the teacher's choice of single gas spectrum tubes. Representative spectra for six common gases are shown below. Student answers may look slightly different than the spectra shown here—differences in equipment may make some gaps difficult to see or change the apparent spacing between the colors. Also, the ability of the eye to detect colors on the edges of the visible spectrum varies from person to person, so some deep violet or deep red lines may be missing.

Sample Spectra (bluer colors → redder colors)

Helium

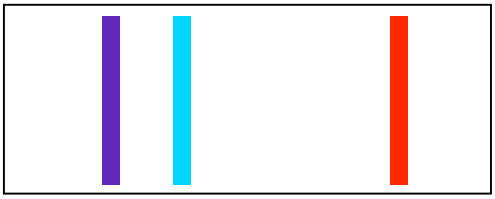


Nitrogen

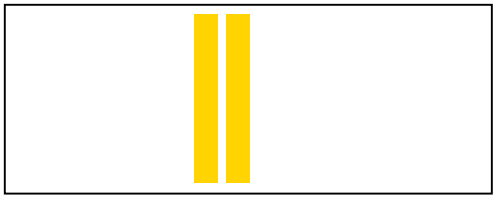


Mercury Vapor

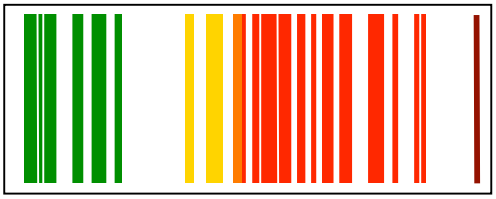
Hydrogen



Sodium



Neon



Chapter 29 Alternative Assessment

Rock Column Correlations

1. Students should correlate the following layers (from bottom to top): granite, sandstone, limestone, shale, conglomerate (top layer of location 3) between all three locations, and the upper layer of shale between locations 1 and 2.

2. The gneiss layer and lower conglomerate layer are missing in locations 1 and 2, the upper sandstone layer is missing in locations 2 and 3, and the upper shale layer is missing in location 3. Location 2 also has a basalt intrusion.

3. Questions
   1. Location 3. It has a gneiss layer under the lowest layers shown in locations 1 and 2.
   2. Gneiss
   3. Location 1. It has a sandstone layer that was deposited on top of the shale and conglomerate layers that are exposed in locations 2 and 3.
   4. sandstone
   5. intrusive—it appears to have been forced up from below the other layers.
   6. Locations 2 & 3. Their missing top layers have probably been eroded.
   7. radiometric
   8. index fossils

Chapter 30 Alternative Assessment
The Past in a Year

Sample Table

Geological Time Table				
		1.	2.	3.
Geologic Time	Millions of Years Ago	Days Ago	Eon, Era, Period, or Epoch	Biological or Geological Events
Archean	3,800	365	Eon	Earth's crust formed
Proterozoic	2,500	240	Eon	Simple marine organisms; stromatolites dominate; formation of iron, copper, and nickel ores.
Cambrian	543	52	Period	First vertebrates, first trilobites, many seaweeds; extensive deposition of sediments in inland seas
Permian	290	28	Period	Mass extinction; final uplift in Appalachians, ice age in South America
Triassic	248	24	Period	Reptiles thrive, forests of conifers and cycads; volcanism and faulting along East Coast, formation of Palisades
Jurassic	206	20	Period	Giant dinosaurs, first birds, earliest mammals; Gulf of Mexico, Atlantic Ocean bulge begin to form
Cretaceous	144	14	Period	Dinosaurs die out, flowering plants and hardwoods rise; uplift of Rockies begins, Colorado Plateau raised
Paleocene	65	6.2	Epoch	Many new mammals appear; uplift in western U.S. continues
Pliocene	5	0.48	Epoch	Hominids appear, modern horse, camel, and elephant develop; North America joined to South America
Pleistocene	2	0.19	Epoch	Hominids appear; Ice Age
Holocene	0.01	0.00096	Epoch	Humans dominant, domestic animals develop; Great Lakes form