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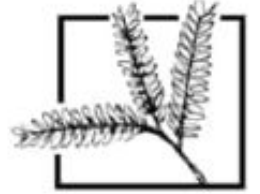
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UNITED ARAB EMIRATES
MINISTRY OF EDUCATION



YEAR OF TOLERANCE

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2018 - 2019

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Activity Lab Manual



2019
عام التسامح



مجموعات فخر الوطن وعام زايد

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Answer Key

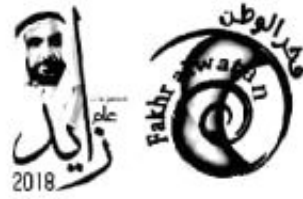
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GRADE 7 VOLUME 3

Activity Lab Manual



مجموعات فخر الوطن وعام زايد



Brief Contents

Chapter 1: Scientific Explanations

Chapter 2: Motion, Forces, and Newton's Laws

Chapter 3: Foundations of Chemistry

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Chapter 13: Climate

Lesson 1 Observing the Universe

Predict three facts that will be discussed in Lesson 1 after reading the headings. Record your predictions in your Science Journal.

Main Idea

Observing the Sky

Electromagnetic Waves



Details

Define each term in the organizer below.

Term	Definition
Earth	One of eight planets revolving around the Sun
Sun	One of billions of stars in the Milky Way galaxy
Milky Way	One of billions of galaxies in the universe

Relate wavelengths of the electromagnetic spectrum to types of stars.

Type of Wave	Wavelength	Energy	Temperature of Star
Gamma rays	shortest	highest	hottest
X-rays	short	high	hottest
Visible light	medium	medium	medium
Infrared waves	long	low	coolest
Radio waves	longest	lowest	coolest

Describe what scientists learn about stars using the electromagnetic spectrum.

Sample answer: We can learn about stars' ages, temperature ranges, and distances from Earth.

Lesson 1 | Observing the Universe (continued)

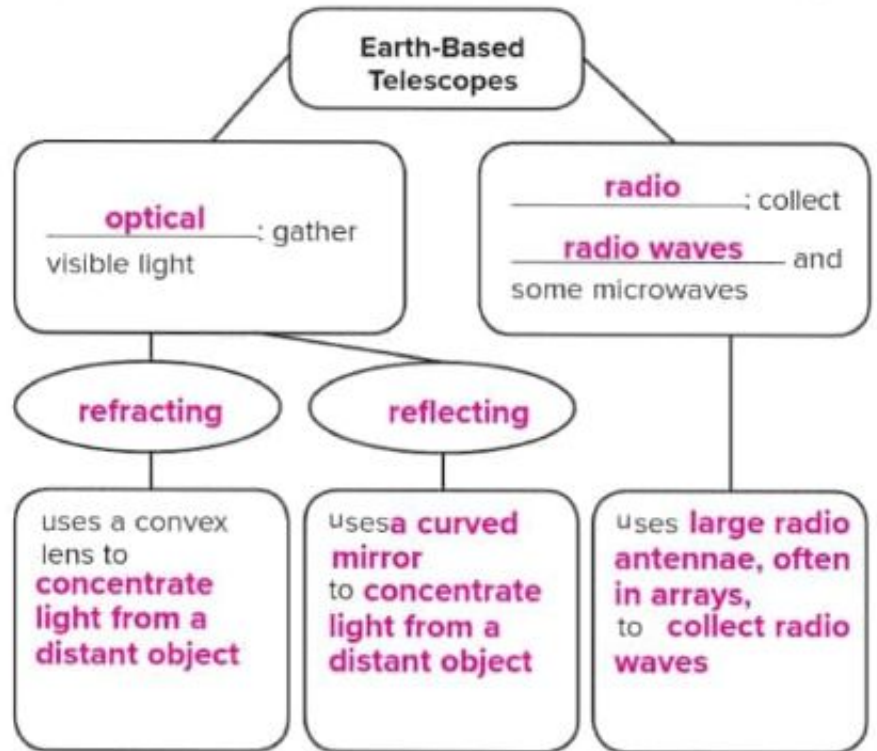
Main Idea

Earth-Based Telescopes

Details



Categorize and describe *Earth-based telescopes.*



Evaluate *the placement of most Earth-based telescopes.*

Type	Placement	Reason
optical	mountain	The thin atmosphere produces less distortion of light.
radio	desert	The dry environment produces less distortion from atmospheric moisture.

Space Telescopes

Differentiate *the collection of electromagnetic radiation.*

Can be collected by telescopes on Earth's surface	Cannot be collected by telescopes on Earth's surface
1. visible light	1. most infrared light
2. some microwaves	2. most ultraviolet light
3. radio waves	3. X-rays

Lesson 1 | Observing the Universe (continued)

Main Idea

Details

Contrast the quality of optical telescopes that are Earth-based with those that are in space.

Location	Image Quality	Explanation
Space	clearer	The sky is darker and there is no weather because there are no atmospheric gases.
Earth-based	can be distorted	Gases of Earth's atmosphere distort images.

Differentiate space telescopes.

	Hubble	Spitzer	James Webb
Wavelength Observed	visible light	infrared radiation	infrared radiation
Launch Date	1990	2003	scheduled for 2013
Orbit	Earth	Sun	Sun
Size Mirror	2.4 m	.34 m (1/50× bigger than Webb's)	16.8 m (7× bigger than Hubble's)

Synthesize It Explain how scientists conclude the ages and distances of stars by observing their electromagnetic energy.

Accept reasonable responses. Sample answer: All electromagnetic waves travel at the speed of light. Astronomers can use that information to determine the amount of time light has been traveling from the star and thus the star's distance from Earth. Stars also cool as they get older; the dominant type of radiation emitted by the star reveals its temperature range.

Lesson 2 Early History of Space Exploration

Scan Lesson 2. Read the lesson titles and bold words. Look at the pictures. Identify the **new** facts discovered about space exploration. Record your facts in your Science Journal.

Main Idea

Rockets

Artificial Satellites



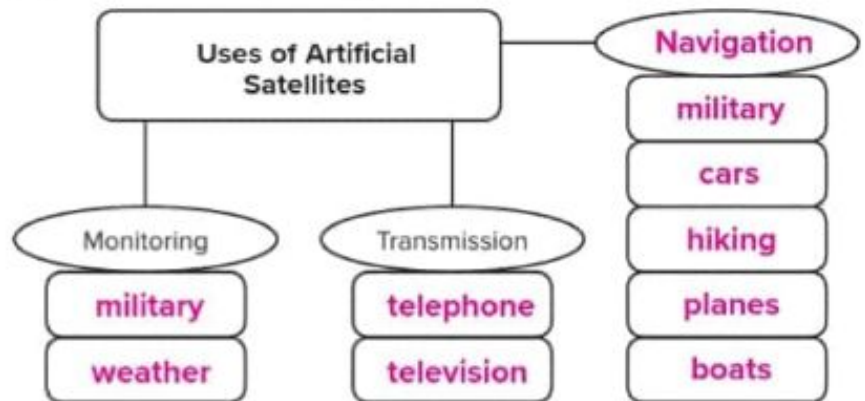
Early Exploration of the Solar System

Details

Contrast how rockets and jet engines get oxygen to burn fuel.

rocket	Thrust from exhaust forces the engine forward.	carries oxygen as part of its fuel supply
jet		draws in oxygen from surrounding air

Characterize artificial satellites.



Differentiate space probes. Give an example of each.

Orbiter	Lander	Flyby
Reaches its destination and slows down enough to be captured in a planet's orbit; <i>Pioneer</i> orbited Venus.	Touches down and can release rovers on surfaces; <i>Phoenix</i> landed on Mars.	Continues past observed objects, eventually leaving the solar system; <i>Voyager 1</i> explored Jupiter and Saturn and continues on.

Distinguish lunar from planetary probes.

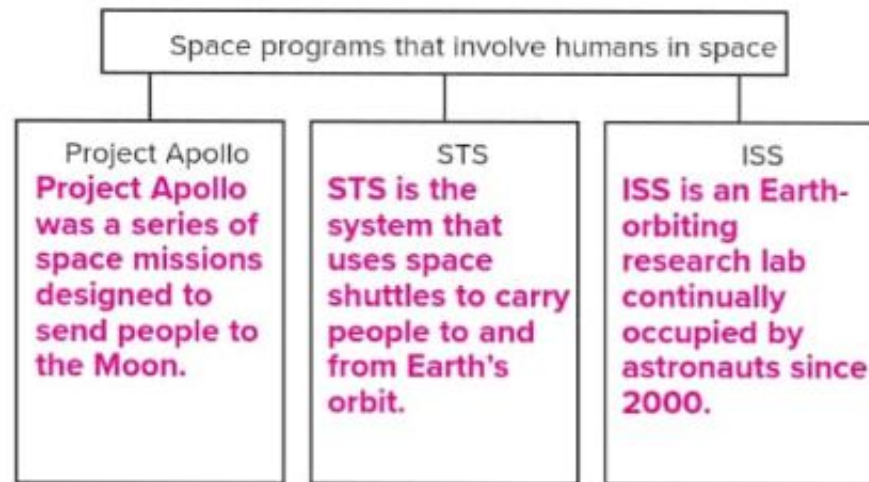
Lunar probes land on the Moon's surface.

Lesson 2 | Early History of Space Exploration (continued)

Main Idea

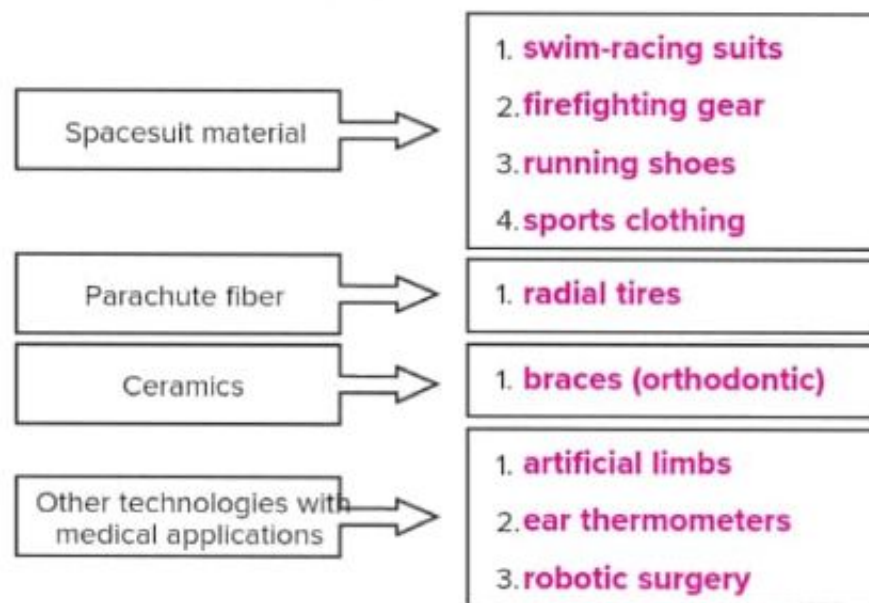
Human Spaceflight

Contrast the differences among three programs that involved putting people in space.



Space Technology

Relate technology developed for the space program to applications in everyday life on Earth.



Analyze It Imagine that you are a scientist planning a space mission. What factors must you consider when deciding whether to send humans or robots on the mission?

Accept all reasonable responses. Sample answer: Missions involving human space travelers are very hazardous and can only occur relatively close to Earth and for short durations of time. Missions of spacecraft without human passengers can travel for years and years and even exit the solar system and never return.

Lesson 3 Recent and Future Space Missions

Skim Lesson 3 in your book. Read the headings and look at the photos and illustrations. Identify three things you want to learn more about as you read the lesson. Record your ideas in your Science Journal.

Main Idea

Missions to the Sun and the Moon



Missions to the Inner Planets

Sample answers are shown.

Details

State the goal of future space exploration.

to expand human space travel within the solar system

Explain the purposes of the types of probes.

Solar	Lunar
help scientists understand the hazards of solar radiation	help scientists collect data to determine the best location for a future lunar outpost

Identify the 4 inner planets.

- Mercury
- Earth
- Venus
- Mars

Express what scientists hope to learn from probes sent to study the inner planets.

- how they formed
- what geologic forces are active on them
- whether they could support life

Detail the inner planetary missions described in the lesson by adding information to the timeline.

1964	The first flyby reached Mars.
1975	Mariner 10 flew by Mercury.
2003	Spirit and Opportunity explored Martian surface.
2004	Messenger is launched.
2008	Messenger flew first pass by Mercury.
2011	Messenger will enter Mercury's orbit.

Lesson 3 | Recent and Future Space Missions (continued)

Main Idea

Missions to the Outer Planets and Beyond

Sample answers are shown.

Human Space Missions

The Search for Life


Details

Identify the 4 outer planets.

1. Jupiter
2. Uranus
3. Saturn
4. Neptune


Identify the outer planetary missions discussed in the lesson by adding details to the timeline.

1997	<i>Cassini was launched.</i>
2004	<i>Cassini entered Saturn's orbit.</i>
2006	<i>New Horizons was launched.</i>
2015	<i>New Horizons will reach Pluto.</i>
2029	<i>New Horizons will leave the solar system.</i>

 **Differentiate** between the human lunar landings of Project Apollo and the next human visits to the Moon.

Apollo lunar landings	<i>brief visits</i>
Future lunar missions	<i>People will live there and do research in lunar outposts.</i>

 **Define** extraterrestrial life.
life that originates outside Earth

 **State** the definition of astrobiology.
the study of life in the universe, including life on Earth and the possibility of extraterrestrial life

Main Idea

Understanding Earth by Exploring Space

Details

Characterize 3 basic needs of all life on Earth.

1. liquid water

2. organic molecules

3. source of energy

State three insights scientists have gained about Earth by studying information gathered in space.

1. how bodies in the solar system influence Earth

2. how Earth formed

3. how Earth supports life

Contrast Earth with the planets that astronomers have detected outside the solar system.

Most of the more than 300 planets are much larger than Earth and probably could not support liquid water or life.

Explain how Earth-orbiting satellites help scientists study our planet.

Earth-orbiting satellites

1. provide large-scale images of Earth's surface

2. help scientists understand Earth's climate and weather

Connect It Explain why scientists search for water in the solar system.

Accept all reasonable responses. Sample answer: Because water is a basic need of all life on Earth, scientists assume that life on other objects in space would also have this need.

Lesson 1 Plate Tectonics

Skim Lesson 1 in your book. Read the headings and look at the photos and illustrations. Identify three things you want to learn more about as you read the lesson. Record your ideas in your Science Journal.

Main Idea

Plate Motion

Details

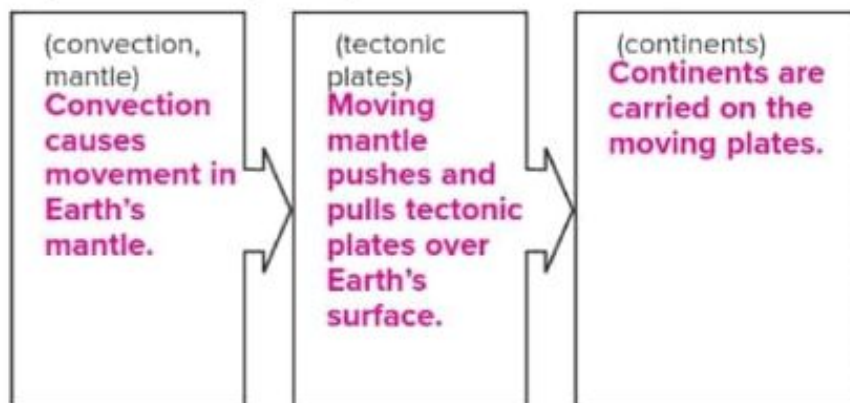
Differentiate plate tectonics from continental drift.

Plate Tectonics	Continental Drift
the theory that Earth's crust is broken into rigid plates that move slowly over Earth's surface	the hypothesis that continents move

Explain evidence of plate tectonics.

Evidence	Explanation
Shape of continents	The shapes of continents fit together like puzzle pieces.
Fossil evidence	The same types of fossils are found on continents that are now separated by vast oceans.
Geological evidence	Similar rocks and mountains are found on continents that are now far apart.

Relate convection to the movement of continents. Include the words in parentheses in your explanations.



Lesson 1 | Plate Tectonics (continued)

Main Idea

Tectonic Plate Boundaries

Details

Key Contrast three main types of plate boundaries.




Type	Description
Convergent	where two plates move toward each other
Divergent	where two plates move apart from each other
Transform	where two plates slide horizontally past each other

Define subduction zone, and circle the boundary in the table above where subduction zones occur.

the area where one plate slides under another

Forces Changing Earth's Surface

Key Diagram forces present at plate boundaries, and write examples of how they change Earth's surface.

	Compression	Tension	Shear
Diagram			
Change	form mountains	form rift valleys and mid-ocean ridges	a shifted road

Sample changes are shown.

Key Connect It Suppose you could time-travel 50 million years into the future. If you took a large map with you, would it be useful? Explain.

Accept all reasonable responses. Sample answer: The continents might still have similar shapes, but they would have moved because of plate tectonics. New mountain ranges and valleys would probably have formed because of plate motion, too. For these reasons, I do not think my map would be very useful.

Lesson 2 Earthquakes and Volcanoes

Scan Lesson 2. Read the lesson titles and bold words. Look at the pictures. Identify three facts you discovered about earthquakes and volcanoes. Record your facts in your Science Journal.

Main Idea

Earthquakes



Details

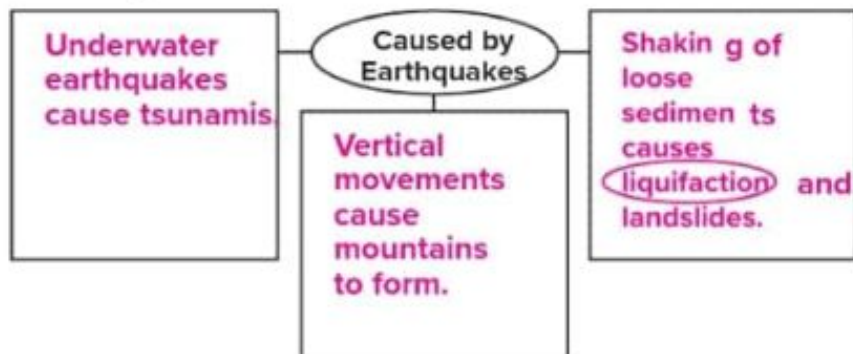
Sequence the events that cause earthquakes.

1. Forces push on rock layers along a fault.
2. **Forces become large enough to cause movement.**
3. **Pieces of crust slide past each other.**
4. **Energy is released, and the ground shakes.**

Generalize the locations at which most earthquakes occur.

Most earthquakes occur near plate boundaries.

Record changes caused by earthquakes. After you complete the organizer, circle the factor that is responsible for the most damage to buildings.



Volcanoes

Identify events that cause volcanoes to form. Circle the location along which mid-ocean ridges form.

Location	Event
Divergent boundary	Lava flows into the rift formed by separating plates.
Convergent boundary	Magma formed as a sinking plate melts, rises, and erupts onto the plate that does not sink.
Hot spots	Volcanoes form far from plate boundaries above places where the mantle melts.

Lesson 2 | Earthquakes and Volcanoes (continued)

Main Idea

Details

Assess the reason magma forms as rocks move from deep inside Earth toward Earth's surface.

Decreased pressure from overlying rocks allows hot rock to melt as they approach the surface.

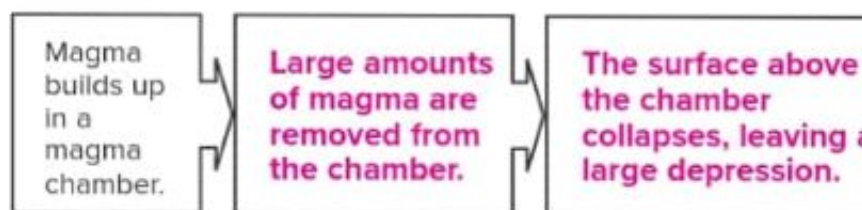
Key **Contrast** changes caused by volcanoes.

Event	Description
Lava flow	Long streams of molten mantle material flow over Earth's surface and build up as flat layers.
Explosive eruption	Crust mixed with magma erupts, solidifies in the atmosphere, and breaks into small pieces of lava called ash.

Key **Diagram** and label the shapes of two types of volcanoes.

Drawings should show a large, gentle-sided volcano.	Drawings should show a cone-shaped volcano. Students might indicate alternating layers of lava and ash.
shield volcano	cone volcano

Key **Sequence** the formation of a caldera.



Key **Describe** effects of volcanoes on the atmosphere.

Ash and gases in the atmosphere can block sunlight, causing the temperature near the surface to decrease.

Sample answer

Key **Analyze It** Explain why earthquakes and volcanoes often occur in the same places.

Both result from pressure and movement that occur at plate boundaries.

Lesson 3 Weathering, Erosion, and Deposition

Predict three facts that will be discussed in Lesson 3 after reading the headings. Record your predictions in your Science Journal.

Main Idea

Weathering

Details

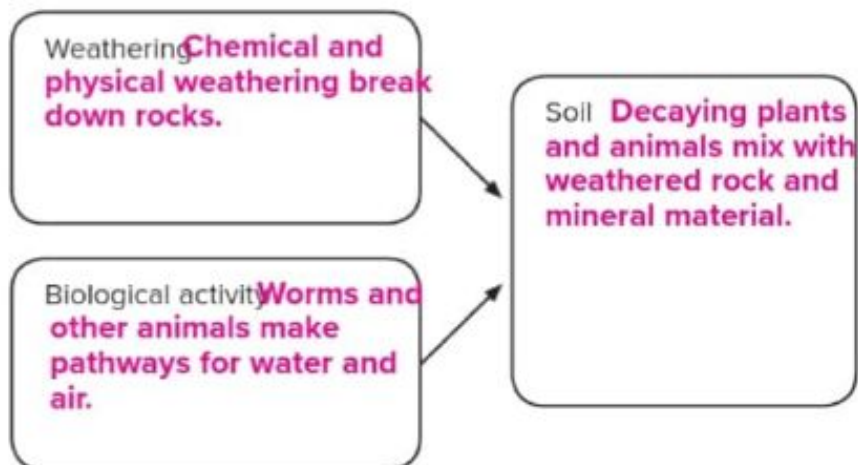
Describe how weathering and erosion work together to wear down mountains.

Weathering is all the processes that break down and change rock. Erosion is the removal of weathered material from one location to another.

Distinguish types of weathering.

Type	Description
Physical weathering	breaks rock into small pieces without changing the chemical composition of the rock
Chemical weathering	changes the composition of rocks and minerals by exposure to water and the atmosphere
Interaction between the two	Physical weathering exposes more surface area to chemical weathering; chemical weathering weakens rock, leading to an increase in the rate of physical weathering.

Relate weathering and biological activity to the formation of soil.



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Lesson 3 | Weathering, Erosion, and Deposition (continued)

Main Idea


Erosion

Deposition


Details

 **Differentiate** processes that change Earth's surface. Include the term sediment in your explanation.

Process	Description
Erosion	the transport of sediment from place to place
by water	Flowing water in rivers and streams carries sediment and small rock.
by ice	Glaciers flowing down a mountain remove rock and sediment, leaving smooth land and deep valleys.
by wind	Strong wind moves sediment and erodes rock not protected by soil and plant life.
Deposition	the process of laying down sediment in a new location
by water	Sediment is deposited when the speed of flowing water decreases.
by ice	Sediment is deposited when glaciers melt.
by wind	Sediment, such as sand in dunes, is carried up one side by the wind and deposited on the other side.

 **Generalize** the movement of sediment in the erosion-deposition cycle.

Sediment is weathered from rock, eroded, and deposited; deposited sediment forms new rock, and the cycle repeats.

 **Connect It** Describe how organisms play a role in the cycle of weathering, erosion, and deposition.

Accept all reasonable responses. Sample answer: Organisms increase the exposure of surface rock to air and water; they also contribute carbon dioxide to the atmosphere, which aids chemical weathering. Decayed plants and animals become part of the soil. Plants that grow in soil help protect surface rocks from wind erosion.

Earth's Changing Surface

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned.

Use this checklist to help you study.

- Complete your Foldables[®] Chapter Project.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Reread the chapter, and review the charts, graphs, and illustrations.
- Review the Understanding Key Concepts at the end of each lesson.
- Look over the Chapter Review at the end of the chapter.



Summarize It Reread the chapter Big Idea and the lesson Key Concepts. Referencing Lessons 1, 2, and 3, describe the many things that could happen to rock on a mountain top over a very long period of time.

Accept all reasonable responses. Sample answer: As described in Lesson 1, the rock could be carried with the mountain and its continent to an entirely different location on Earth as a result of plate tectonics. It could also be subducted under another plate and melted as a result of tectonic movements.

As described in Lesson 2, the sediment could be blasted into the atmosphere as volcanic ash if it were part of a volcano. It could also be melted to form part of a lava flow.

As described in Lesson 3, the sediment could be weathered into smaller pieces by wind or other processes, eroded (moved to another location) by a glacier or stream, and deposited anywhere along that path. It also might make its way all the way to a sedimentary basin before being deposited.

Challenge Research news stories to learn about a recent natural event that significantly changed Earth's surface. Design a poster about the event that includes both pictures and written descriptions. Present the poster to your class.

Weather and Its Impacts



How does weather impact the environment?

Before You Read

Before you read the chapter, think about what you know about weather. Record three things that you already know about weather in the first column. Then write three things that you would like to learn about in the second column. Complete the final column of the chart when you have finished the chapter.

What I Know	What I Want to Learn	What I Learned

Chapter Vocabulary

Lesson 1	Lesson 2	Lesson 3	Lesson 4
<p>NEW air pressure troposphere convection evaporation condensation</p>	<p>NEW humidity precipitation air mass pressure system front</p>	<p>NEW cumulonimbus cloud thunderstorm lightning tornado hurricane storm surge drought</p> <p>ACADEMIC monitor</p>	<p>NEW ecoregion climate groundwater surface water watershed erosion deposition</p>

A Lesson Content Vocabulary page for each lesson is provided in the Chapter Resources Files.

Lesson 1 The Atmosphere

Scan Lesson 1. Read the lesson titles and bold words. Look at the pictures. Identify three facts you discovered about the atmosphere. Record your facts in your Science Journal.

Main Idea

Composition and Structure of the Atmosphere

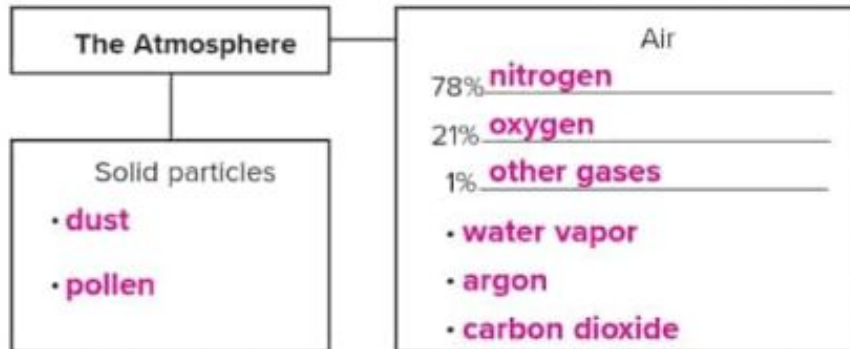
Sample particulates are listed.



Moving Air

Details

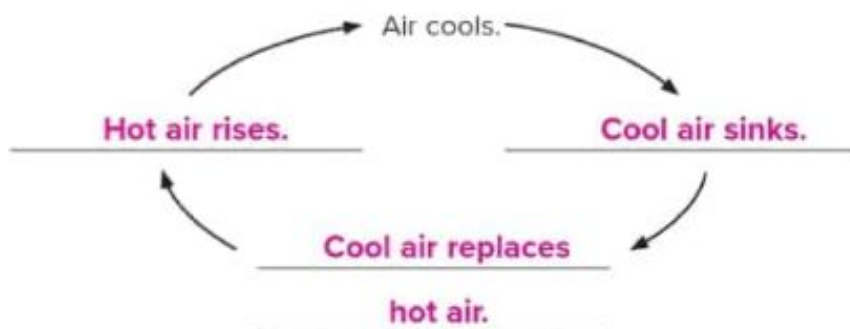
Characterize the composition of the atmosphere.



Order the layers of the atmosphere. Circle the layer with the highest air pressure.

Layer	Altitude
Exosphere	beyond 320 km
Thermosphere	from 80 km to about 320 km
Mesosphere	from 50 km to about 80 km
Stratosphere	from 10 km to about 50 km
Troposphere	from Earth's surface to about 10 km

Complete the diagram of convection.



Lesson 1 | The Atmosphere (continued)

Main Idea

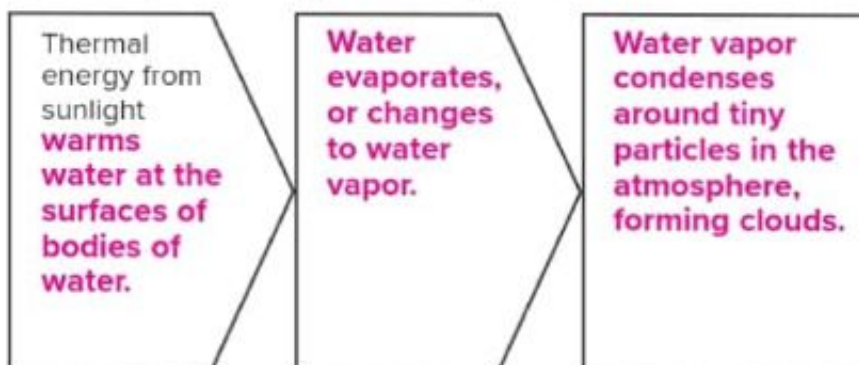
Clouds

Details

Contrast evaporation *and* condensation.

Evaporation	Condensation
process by which liquid water changes into water vapor	process by which water vapor changes back into small droplets of water

Sequence the formation of clouds.



Describe the 3 main types of clouds.

Cumulus	Stratus	Cirrus
puffy clouds that look like cotton balls	low clouds that spread across most of the visible sky	high clouds that form long, wispy shapes

Connect It Observe the atmosphere outdoors today. Describe what you see and feel.

Accept all reasonable responses. Sample answer: The air is cool and still. Sometimes I feel a slight breeze. I see water vapor that has condensed into puffy cumulus clouds. If I watch closely, I can see that the clouds are moving with the wind.

Lesson 2 Weather

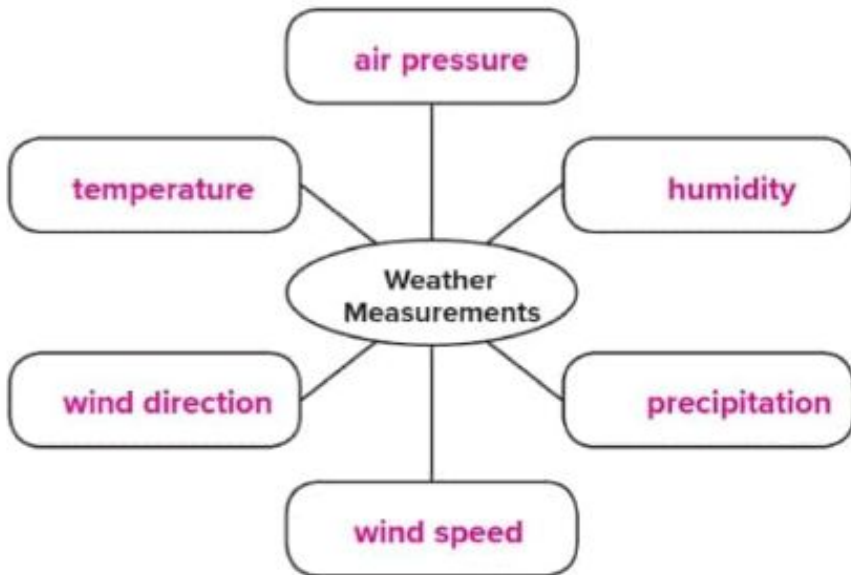
Predict three facts that will be discussed in Lesson 2 after reading the headings. Write your facts in your Science Journal.

Main Idea

What is weather?

Details

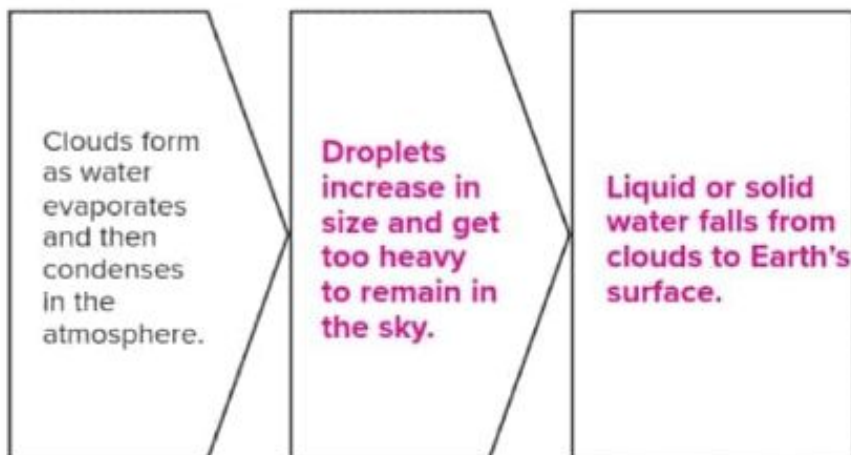
Identify measurements used to describe weather.



Name instruments used for weather measurements.

Air Temperature thermometer	Air Pressure barometer
Wind Speed anemometer	Wind Direction wind sock

Sequence the formation of precipitation.



Main Idea


Details

Differentiate *three types of winter precipitation.*


Snow: forms when the temperature is below freezing both in the clouds and between the clouds and Earth's surface

Sleet: forms when rain freezes on its way to Earth's surface


Freezing rain: forms when rain freezes after it reaches Earth's surface

 **Explain** *why weather changes.*

As air moves around the troposphere, it contacts air that has different temperature, pressure, and humidity.

 **Contrast** *weather terminology. Describe the weather associated with each event. Use the term air mass in your descriptions of fronts.*

<p>High-Pressure System Cool air sinks to Earth's surface; associated with clear skies</p>	<p>Low-Pressure System Warm air rises through the troposphere; associated with precipitation and storms</p>
<p>Cold Front the area where a cold air mass replaces a warm air mass; associated with cumulus clouds and thunderstorms</p>	<p>Warm Front the area where a warm air mass replaces a cold air mass; associated with storms or stratus followed by cirrus clouds</p>

 **Analyze It** Explain why you would be interested in looking at weather measurements on a map showing places other than where you live.

Accept all reasonable responses. Sample answer: From the weather conditions of areas near you, and observations of the direction of wind and its speed, you can forecast what kind of weather will be moving into your area in the near future.

Lesson 3 Severe Weather

Scan Lesson 3. Read the lesson titles and bold words. Record three facts you discovered about severe weather in your Science Journal.

Main Idea

Thunderstorms

Tornadoes

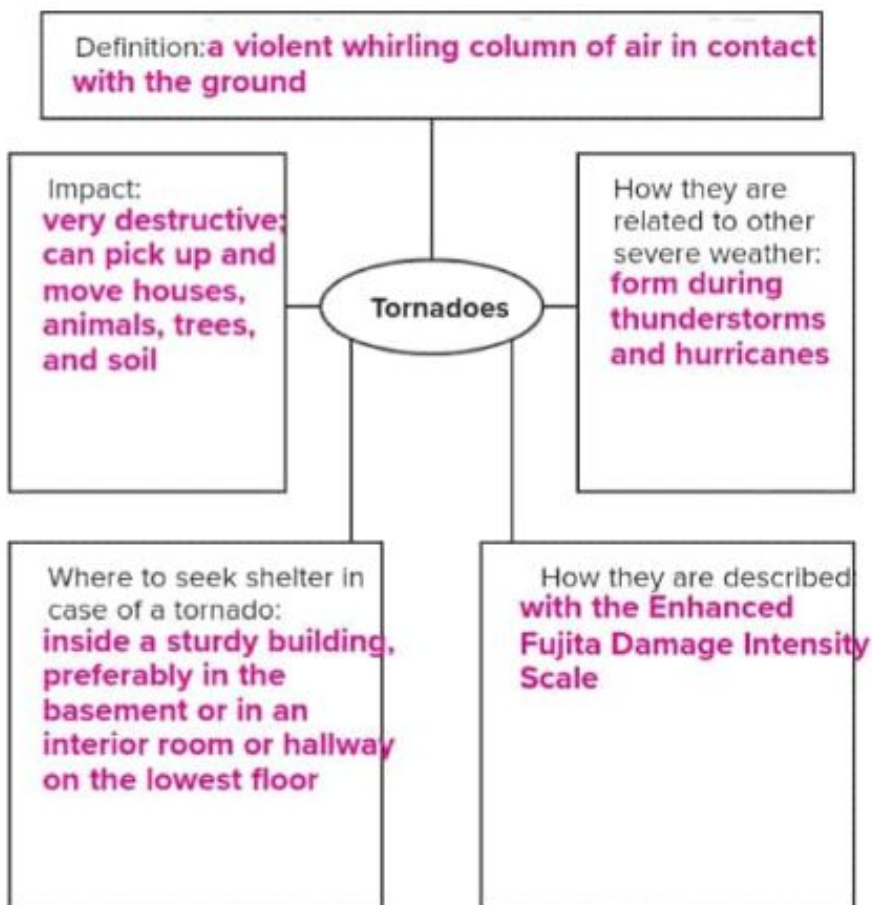


Details

Sequence the formation of thunderstorms. Use the words in parentheses in your explanations.

1. Warm, moist air rises then cools. Cooling air sinks, starting the process of convection.
2. (cumulonimbus clouds, precipitation) **Water vapor condenses, cumulonimbus clouds form, and precipitation falls.**
3. (lightning, thunder) **Convection causes molecules to bump into each other, producing electric charges; the discharge is called lightning. Lightning heats air molecules, producing a loud bang of thunder.**

Characterize tornadoes.



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Lesson 3 | Severe Weather (continued)

Main Idea

Hurricanes

Sample effects are shown. Students might write others.

Other Natural Events

Sample effects are shown.

Details

Define hurricane, and record two other names by which hurricanes are known.

Hurricane: an intense tropical storm with winds exceeding 119 km/h; can produce lightning, downpours, and tornadoes

Other names: typhoon, tropical cyclone

Sequence the formation of hurricanes. Use the words in parentheses in your explanations.

1. (Africa) **Thunderstorms form near the west coast of northern Africa.**
2. (ocean, tropical storm) **Warm ocean water provides energy for a thunderstorm to become a tropical storm.**
3. (Atlantic, hurricane) **The storm strengthens into a hurricane as it moves west across the Atlantic Ocean.**

Describe some effects of hurricanes.

Storm surge: flooding of coastal areas

Wind: destroys trees and buildings

Rain: causes flooding, mudslides, and landslides

Identify effects of other severe weather events.

Event	Example of Effect
Winter storm	The weight of ice can break tree branches and snap power lines.
Extreme heat	Heat waves can lead to life-threatening heat stroke and heat exhaustion.
Drought	Crops die, and soil might be eroded by winds.

Synthesize It Based on what you have learned about severe weather in Lesson 3, why are the weather forecasting methods discussed in Lesson 2 important?

Accept all reasonable responses. Sample answer: Severe weather events can cause a lot of damage and injury, or even death. Knowing in advance that severe weather is coming can allow people to prepare and take proper shelter or evacuate.

Weather and Its Impacts

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned. Complete the final column in the chart on the first page of the chapter.

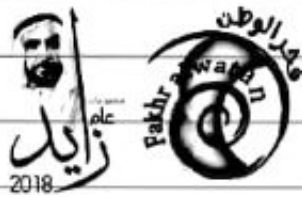
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Summarize It Reread the chapter Big Idea and the lesson Key Concepts. Summarize how the atmosphere is related to an ecoregion.

Accept all reasonable responses. Sample answers: The atmosphere is where weather occurs. Long-term patterns of weather make up climate; precipitation and where water drains in the watershed determine the plants and animals that live in an area. This combination of factors makes up the ecoregion.



Challenge Research a severe weather event that has occurred during your lifetime. Write a fictional story, with factual details, about what it would have been like to experience the event. Share your story with your class.

Lesson 1 Climates of Earth

Scan Lesson 1. Record three questions you have about Earth's climates in your Science Journal. Try to answer your questions as you read.

Main Idea

What is climate?

What affects climate?



Details

Define climate.

Climate: long-term average weather conditions that occur in a particular region

Identify 4 factors that determine a region's climate.

1. latitude
2. proximity of large bodies of water
3. altitude
4. urban or rural area

Describe how latitude affects climate in different regions on Earth.

Polar regions: colder because they receive less solar radiation per unit of surface area

Locations near the equator: warmer because they receive the most solar radiation per surface unit

Middle latitudes: areas between 30° and 60°; hot summers and cold winters

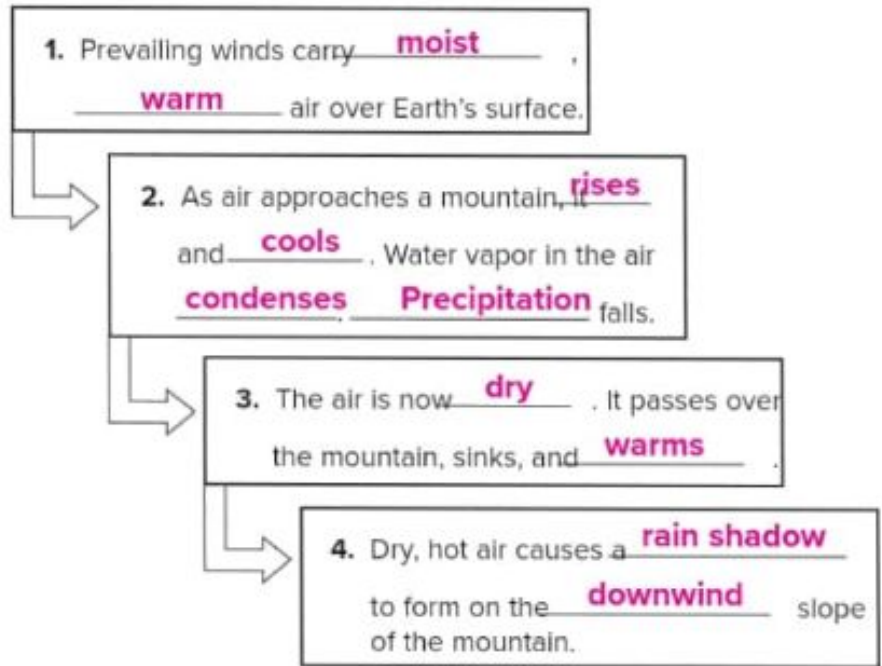
Compare how altitude and latitude influence temperature.

Altitude	Latitude
As altitude increases, temperature <u>decreases</u> .	As latitude increases, temperature <u>decreases</u> .

Main Idea

Details

Sequence the events that result in a rain shadow.



Large Bodies of Water

Define specific heat, and then explain how the specific heat of water can influence the climate of an area.

Specific heat: **the amount of heat needed to raise the temperature of 1 kg of a material by 1°C**

Explanation: **Water has a higher specific heat than land. Because water heats and cools more slowly, areas near large bodies of water have a more constant temperature throughout the year than areas away from bodies of water.**

Classifying Climates

Define microclimate, and identify three microclimates.

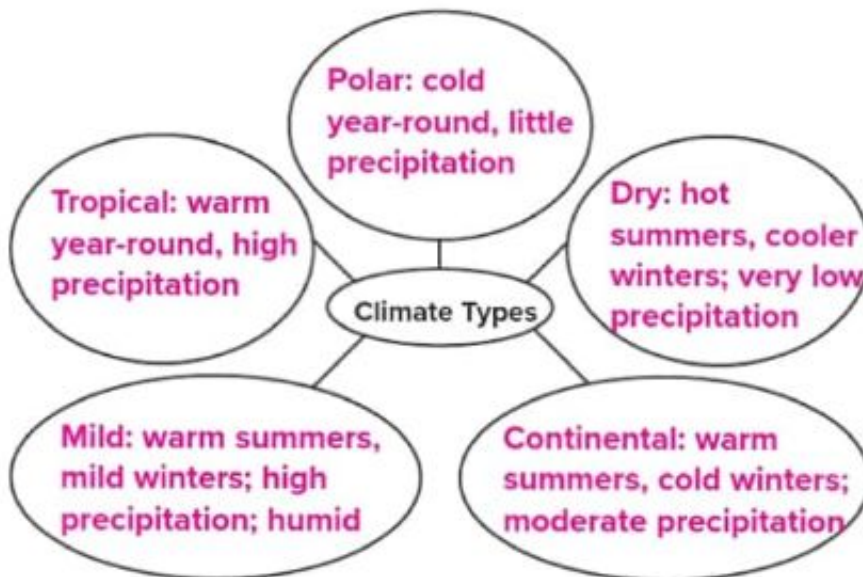
Microclimate: **a localized climate that is different from the climate of the larger area surrounding it**

- 1. **forests**
- 2. **urban heat island**
- 3. **hilltops**

Main Idea

Details

Identify and describe *Köppen's 5 climate types.*



Explain *two ways that climate can affect people.*

Agriculture: Temperature and rainfall determine the types of crops that can be grown.

Architecture: Houses and other buildings are built according to the climate of an area.

Analyze *how climate affects each of the following organisms.*

Polar bears: have thick fur and a layer of fat for warmth

Desert plants and animals: have adaptations for water conservation in hot, dry conditions

Deciduous trees: conserve energy and moisture in winter by losing leaves

Connect It Classify the climate in your area, and give reasons for your classification.

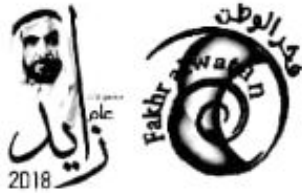
Accept all reasonable responses. Responses should include a description of the temperature, precipitation, altitude, latitude, and proximity of large bodies of water, mountains, or cities in your area.

Lesson 2 Climate Cycles

Predict three facts that will be discussed in Lesson 2 after reading the headings. Record your facts in your Science Journal.

Main Idea

Long-Term Cycles



Details

Distinguish four ways scientists learn about past climates.

1. ice cores drilled from glaciers
2. growth rings of trees
3. fossilized pollen
4. ocean sediments

Compare an ice age with an interglacial.

Ice age: cold period lasting from hundreds to millions of years in which glaciers cover much of Earth

Interglacial: warm period that occurs between ice ages

Model the time spanned by Earth's most recent ice age and interglacial on the time line. Use these labels:



Identify four causes of Earth's long-term climate cycles.

1. change in shape of Earth's orbit
2. change in angle of tilt of Earth's axis
3. movement of Earth's continents
4. changes in ocean circulation

Main Idea

Short-Term Cycles

Details

Summarize the causes of short-term climate cycles.

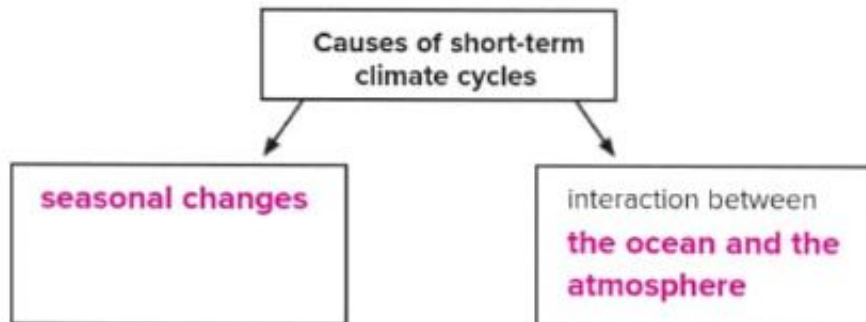


Diagram the position of Earth and its axis in relation to the Sun during summer and winter in the northern hemisphere.

Drawings should show the Sun, Earth and its axis, and the angle that sunlight strikes Earth; the northern hemisphere should be tilted toward the Sun

Summer in the Northern Hemisphere

Drawings should show the Sun, Earth and its axis, and the angle that sunlight strikes Earth; the northern hemisphere should be tilted away from the Sun

Winter in the Northern Hemisphere

Explain, in your own words, how the tilt of Earth's axis causes seasons.

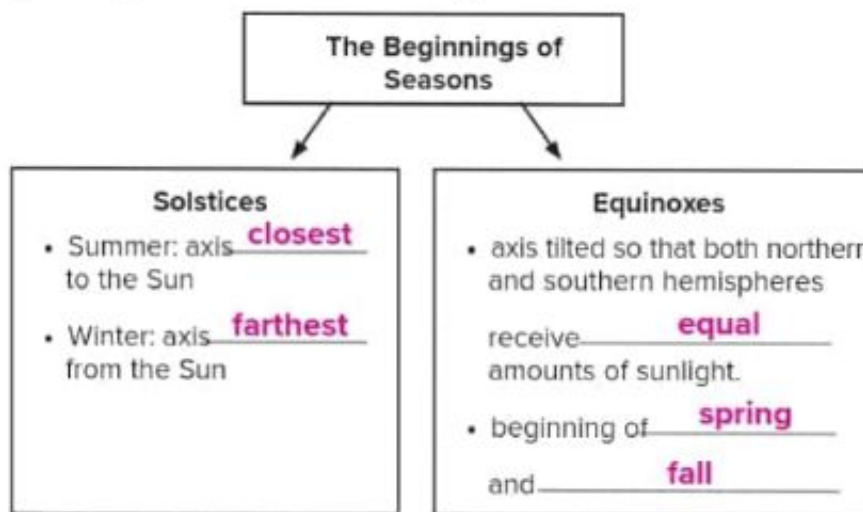
Sample answer: The tilt of Earth's axis causes different amounts of solar radiation to fall on portions of Earth's surface at different times of the year. When the axis is pointed toward the Sun, more solar radiation falls on that part of Earth, and temperatures are warmer. When the axis is pointed away from the Sun, less solar radiation falls on that part of Earth, and temperatures are cooler.

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Main Idea

Details

Review How Earth's equinoxes and solstices mark the beginning of each of the 4 seasons in this organizer.



Sequence the statements to describe the phenomenon of El Niño/Southern Oscillation.

- 3** Warm water surges back to South America, preventing cold water from upwelling.
- 1** Trade winds that blow from east to west weaken.
- 2** The normal pattern of high and low pressure across the Pacific is reversed.

Compare ENSO and NAO weather patterns.

ENSO: El Niño/Southern Oscillation	NAO: North Atlantic Oscillation
Description: combined ocean and atmospheric cycle that results in weakened trade winds across the Pacific Ocean	Description: combined ocean and atmospheric cycle that changes the position of the jet stream
Weather Pattern: Western coast of South America warms and receives more precipitation; and Europe other areas experience droughts and violent storms.	Weather Pattern: affects the strength of storms in North America



Main Idea

Details

Droughts, Heat Waves, and Cold Waves

Explain how monsoons change with the seasons.

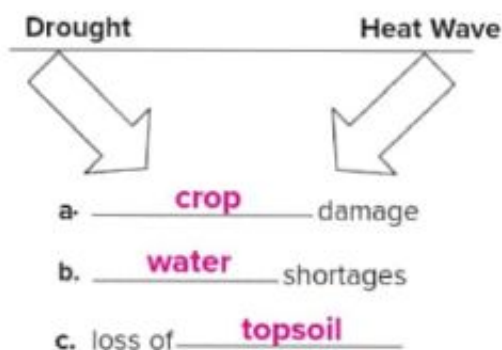
Summer: Warm air over land rises and causes low-pressure areas to form. Cooler, heavier air sinks over the water, forming high-pressure areas. The winds blow from the water toward the land, bringing heavy rainfall.

Winter: The pattern reverses and winds blow from the land toward the water. Drier weather results.

Define drought.

Drought: period with below-average precipitation

Model the results of a drought and a heat wave occurring at the same time.



Describe the cause of cold waves.

Cold waves occur when a large continental polar air mass stays over a region for days or weeks, causing unusually cold temperatures.

Analyze It Review what can happen during a drought and heat wave. What might be the effect of a cold wave?

Accept all reasonable responses. Sample answer: A cold wave might be harmful to many living things. Fuel costs and usage would rise. People caught in the cold could suffer hypothermia or other ill effects. Many plants could be damaged and animals could freeze if the cold weather were prolonged.

Lesson 3 Current Climate Change

Skim Lesson 3 in your book. Read the headings and look at the photos and illustrations. Identify three things that you want to learn more about. Write your ideas in your Science Journal.

Main Idea

Regional and Global Climate Change

Human Impact on Climate Change



Details

Summarize Earth's air temperature over the past 100 years.

- 1880–1900 temperatures remained steady
- 1900–1945 temperatures increased slightly
- 1945–1975 temperatures cooled
- 1975–2000+ temperatures increased steadily

Define global warming, and explain the conclusion of the Intergovernmental Panel on Climate Change (IPCC).

Global warming: the rise in Earth's average surface temperature during the past 100 years

The IPCC concluded that most of the temperature increase is due to human activities such as burning fossil fuels and deforestation.

Explain how greenhouse gases affect Earth's temperatures.

Natural Greenhouse Effect		
<p><u>Carbon dioxide</u> (CO₂), <u>methane</u>, and water vapor <u>absorb</u> Earth's outgoing infrared <u>radiation</u>.</p>		<p>Temperatures suitable for life are <u>maintained</u>.</p>
Over the Last 120 Years		
<p>An increase in CO₂ levels causes <u>greater</u> <u>greenhouse effect</u>.</p>		<p>Average surface temperatures have been <u>rising</u>.</p>

Lesson 3 | Current Climate Change (continued)

Main Idea

Details

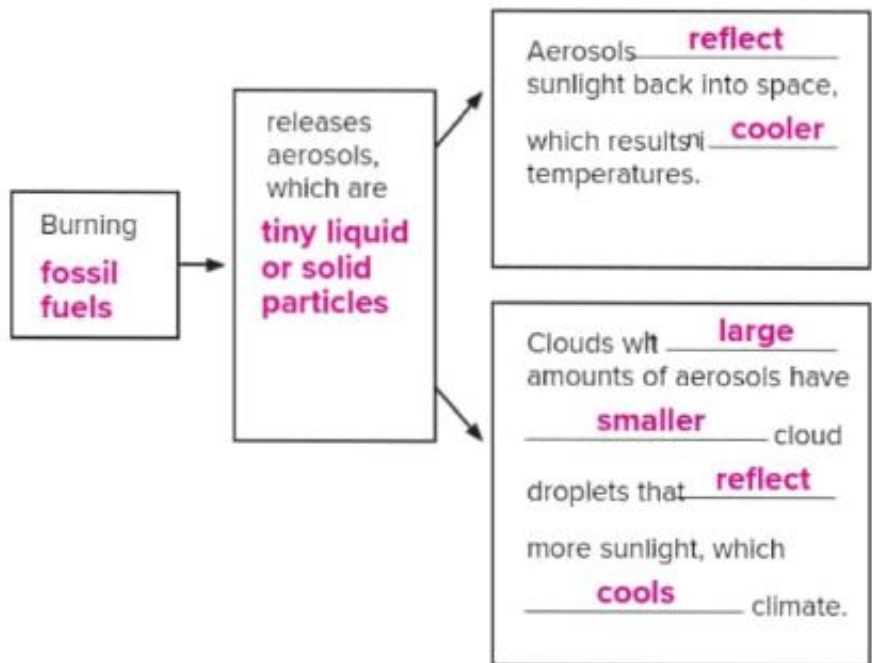
Identify three natural sources of carbon dioxide (CO₂).

1. volcanic eruptions
2. forest fires
3. cellular respiration

Recall two human-caused sources of carbon dioxide (CO₂).

- Human sources
- burning fossil fuels
 - deforestation

Explain how aerosols are released into the atmosphere.



Climate and Society

Identify the problems climate change poses for society.

Cause	Effect
<u>heat waves</u> and <u>drought</u>	food and water shortages
excessive rainfall	flooding and mudslides

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Main Idea

Details

Predicting Climate Change



Students might also list planting trees, conserving fuel, and recycling.

Explain the environmental impacts of climate change.

Warmer Temperatures	
a.	cause more water to <u>evaporate</u> , producing <u>heavy rainfall</u> and <u>frequent</u> storms.
b.	<u>melt</u> glaciers and polar ice sheets and cause <u>sea level</u> to rise.
c.	melt the frozen <u>soil</u> in the Arctic, changing <u>migration</u> patterns.
d.	cause <u>extreme</u> weather events to become more common.

Define the global climate model (GCM), and explain the limitations of the model's predictions.

GCM: is a set of complex equations used to predict future climates; predictions cannot be immediately compared to real data

Describe two activities of increasing human populations that might affect climate.

- continued clearing of forests for expanding cities
- increased amount of greenhouse gases and other pollutants released into the atmosphere

Identify two ways people can reduce greenhouse gases.

- develop alternative sources for energy
- reduce automobile emissions

Synthesize It Identify ways that people in your community could help to reduce greenhouse gases.

Accept all reasonable responses. Answers might include recycling; developing means of alternative transportation, such as public transportation, walking, riding bikes, or car pooling; and planting trees.

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned. Complete the **What I Learned** column on the first page of the chapter.

Use this checklist to help you study.

- Complete your Foldables[®] Chapter Project.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Reread the chapter, and review the charts, graphs, and illustrations.
- Review the Understanding Key Concepts at the end of each lesson.
- Look over the Chapter Review at the end of the chapter.



Summarize It Reread the chapter Big Idea and the lesson Key Concepts. Analyze the information you have learned about climate. Explain how climate affects your life.

Accept all reasonable responses: Students should mention temperature and precipitation. They should explain how the climate affects their activities, the way they dress, the sports they participate in, and the way their homes are built.



Challenge Examine the effects of urban sprawl in your area. Describe how the changes made by an expanding city might affect the local climate.