



Lesson Plan: Earth's Atmosphere

Grade Level: 6

Subject: Earth Science

Duration: 45–60

NGSS MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

Learning Objectives

By the end of this lesson, students will be able to:

- **Identify** the composition of Earth's atmosphere and the relative proportions of its main gases.
- **Describe** the five layers of the atmosphere and their unique characteristics.



PREVIEW

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- **Mesosphere:** The coldest layer of the atmosphere located in the middle, where temperatures can be as low as negative 100 degrees Celsius.
- **Thermosphere:** The uppermost atmospheric layer where temperature increases with altitude because particles move very rapidly, though there are very few particles present.
- **Convection:** The transfer of heat energy through moving currents of air. Warm air near the surface is less dense so it rises, cools, becomes denser, and sinks back to the surface, creating circular currents.



Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-earth-s-atmosphere-1.pdf>)
- Activity Lesson handout on atmospheric layers (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-earth-s-atmosphere-1-earth-s-atmosphere-4.pdf>)
- Vocabulary matching worksheet (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-1.pdf>)
- Assessment worksheet (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-0.pdf>)
- A clear plastic bottle with cap
- Hot water and ice cubes
- Food coloring



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stratosphere, mesosphere, thermosphere, and exosphere.

(<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-earth-s-atmosphere-1.pdf>)

- Demonstrate atmospheric pressure and convection by filling a clear plastic bottle halfway with hot water colored with food dye, then placing an ice cube on top to show how temperature differences create convection currents as the cold water sinks and warm water rises.
- Discuss how atmospheric pressure decreases with altitude because there are fewer gas molecules at greater distances from Earth's surface.



(<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-earth-s-atmosphere-1.pdf>)

- Explain the role of the ozone layer in the stratosphere and how it protects life by filtering harmful ultraviolet radiation. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-earth-s-atmosphere-1.pdf>)

Step 3: Guided Practice (15 minutes)

- Distribute the Activity Lesson handout and work through labeling the atmospheric layers diagram as a class. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-earth-s-atmosphere-1-earth-s-atmosphere-4.pdf>)
- Discuss the characteristics of each layer, including temperature changes, altitude ranges, and unique features such as the ionosphere and aurora displays. (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-earth-s-atmosphere-1-earth-s-atmosphere-4.pdf>)
- Complete the vocabulary matching worksheet together, reinforcing key terms such as atmosphere, atmospheric pressure, convection, and the layer names.



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(<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-0.pdf>)

- Review student diagrams for accuracy in labeling layers, altitude ranges, and temperature characteristics.
- Have students classify real-world examples: Where would a commercial airliner fly? In which layer do auroras occur? Where is the ozone layer located?

Differentiation Strategies



For advanced learners:

- Challenge students to research and present on how human activities such as chlorofluorocarbon emissions have affected the ozone layer and what international agreements have been made to address ozone depletion.
- Have advanced learners create a scale model of the atmosphere showing the relative thickness of each layer and calculate what percentage of the total atmosphere each layer represents.

For learners needing support:

- Provide a pre-labeled atmospheric layers diagram with color-coded sections so students can focus on matching characteristics rather than recalling layer names from memory.
- Offer sentence frames for describing each layer, such as: The troposphere is the layer where blank because blank.



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- Activity Lesson PDF (<https://newpathworksheets.com/api/activity-lesson/activity-lesson-science-grade-6-earth-s-atmosphere-1-earth-s-atmosphere-4.pdf>)
- Worksheet PDF 1 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-0.pdf>)
- Worksheet PDF 2 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-1.pdf>)
- Worksheet PDF 3 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-2.pdf>)



- Worksheet PDF 4 (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-earth-s-atmosphere-1-3.pdf>)
- Vocabulary PDF 1 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-1.pdf>)
- Vocabulary PDF 2 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-2.pdf>)
- Vocabulary PDF 3 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-3.pdf>)
- Vocabulary PDF 4 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-4.pdf>)
- Vocabulary PDF 5 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-5.pdf>)
- Vocabulary PDF 6 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-6.pdf>)
- Vocabulary PDF 7 (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-earth-s-atmosphere-1-7.pdf>)



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THE EARTH'S ATMOSPHERE

The Composition of Earth's Atmosphere

The Earth is unique in our solar system because it has an atmosphere that can support life. By comparison, Venus has an atmosphere that is high in ammonia and other caustic gases; it is so dense that it would crush a human. On the other hand, Mars has no atmosphere at all. Earth's atmosphere contains oxygen, nitrogen, water and other gases. It is 78% nitrogen, 21% oxygen and 1% other gasses including carbon dioxide and water vapor.

Properties of the Earth's Atmosphere

Earth's atmosphere has mass and weight because it contains

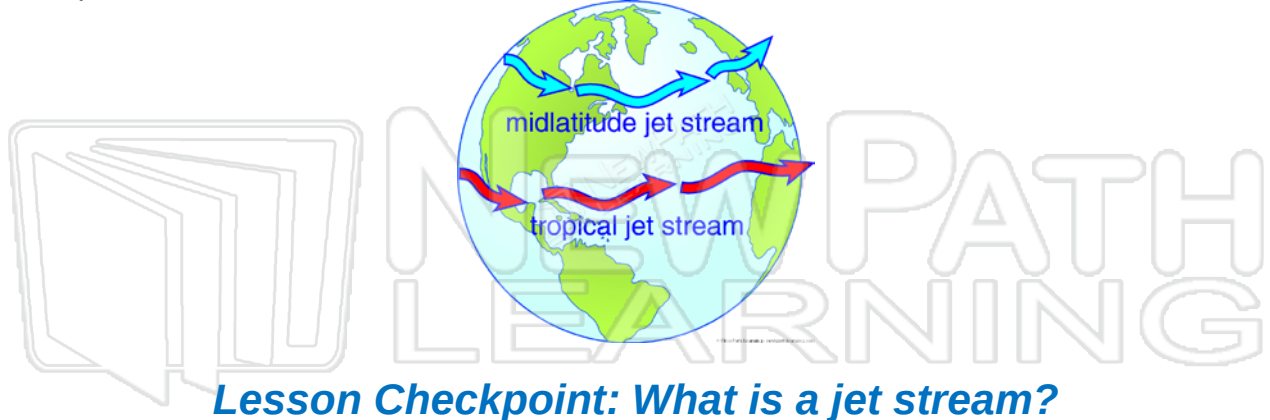


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from the equator to the poles. For example, the winds that blow from 30 degrees latitude (north and south) and in a westerly direction are called the **trade winds**. The **westerlies** are winds that blow from the southwest to the northeast from 30 degrees to 60 degrees latitude (north and south). The **easterlies** are winds that blow from the poles to 60 degrees latitude (north and south). The easterlies blow toward the west.

There are also belts of high-speed winds that occur high in the atmosphere. They significantly affect weather patterns. These winds can move at speeds as great as 500 kilometers/hour. These high-speed winds are known as **jet streams**.



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The next layer above the stratosphere is the **mesosphere**. “Mesosphere” is from two Greek words that mean “middle ball,” because this layer is in the middle of the atmosphere. It is the coldest layer of the atmosphere: temperatures here can be as low as –100 degrees Celsius. It is the least understood of the atmospheric layers.

Above the mesosphere is the **thermosphere**. In this layer of the atmosphere, temperature increases with altitude. There are very few particles in this layer, but the particles move very rapidly. It does not feel hot in the thermosphere, however. It is described as having a very high temperature because the particles in the thermosphere are moving so rapidly. (Temperature is a function of the motion of particles, not of how “hot” it feels. When particles are close to one another, as in the troposphere, they bump into each other and heat is created.)

The ionosphere is the upper part of the thermosphere. The ionosphere is a portion of the atmosphere that radiates energy in the



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holds heat. Energy is transferred from the sun as electromagnetic radiation. The heat we feel at the surface of the Earth is the result of the molecules moving rapidly due to this radiation. This movement results in heat. Obviously, without the right amount of heat, life could not exist.

Different processes transfer heat in the troposphere (that is, the air at Earth’s surface). When two objects touch each other, heat moves by **conduction** from the warmest to the coolest until the temperatures of the two objects are equal. Heat transfers to the air from solid objects on the Earth’s surface and from the surface itself.

Moving currents of air transfers most of the heat energy that is in the atmosphere. This is called **convection**. Warm air near the surface is less dense so it rises. As it does, it cools and becomes denser so it sinks back to the surface. This creates circular currents called **convection currents** (which work just like convection currents that circulate magma in the Earth's mantle).

There is growing concern that heat is building up near the Earth's surface. **Radiation balance** is the phrase that refers to the balance between the amount of electromagnetic radiation that comes into the Earth's atmosphere and the amount of heat that leaves the atmosphere. When the balance is thrown off, too much heat can accumulate which can cause dramatic changes in global environments. Some scientists have studied the Earth's present climate and have concluded that there is a dangerous accumulation of carbon dioxide and other gases in the atmosphere from the burning of fossil fuels. This accumulation of carbon dioxide and other gases is the



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gases, dust, swamp gas, pollen and smoke from wildfires are all considered forms of natural pollution. As we know, humans put tons of pollutants into the atmosphere every day.

Scientists categorize air pollution into two groups. **Primary pollution** is pollution that is put directly into the air, such as volcanic ash or exhaust from a car. **Secondary pollution** is pollution that is created when primary pollution reacts with something in the air. For example, smog is a secondary pollutant. When car exhaust reacts with light and air, ozone is created. Ozone in turn reacts with more car exhaust to create smog.

Acid precipitation is another secondary pollutant created by the burning of fossil fuels. Burning coal and oil that has high sulfur content releases the sulfur into the air. The sulfur then reacts with water to form sulfuric acid. Sulfuric acid raises the pH of lakes, ponds and streams and causes corrosion.

Air pollution is truly a global concern. When pollutants are put into the air in one place, they are easily carried by winds to distant places. The acid rain and other problems created by airborne pollution are never just a local problem. They are carried hundreds of miles and can affect the environments of communities hundreds if not thousands of miles away.

Lesson Checkpoint:
What is secondary pollution?



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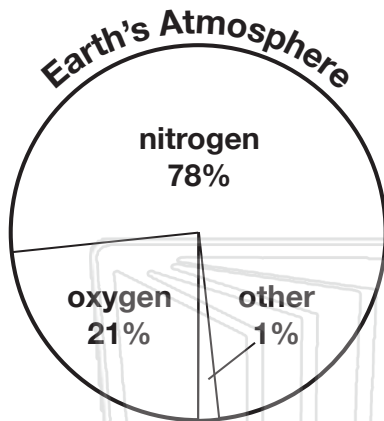
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Earth's Atmosphere

Name _____ Class _____ Date _____



Layers of Earth's Atmosphere

The Earth is unique in our solar system because it has an **atmosphere** that can support life.

The **outermost** layer of Earth's atmosphere is called the **exosphere**. Only very light gases, like hydrogen, helium and individual



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stratosphere includes the **ozone layer**.

The **troposphere** is the layer of the atmosphere in which **we live**. Oxygen, nitrogen, carbon dioxide, water vapor, pollution and **weather** are found in this layer.

mesosphere

50 km

stratosphere

10 km

troposphere

-52° C



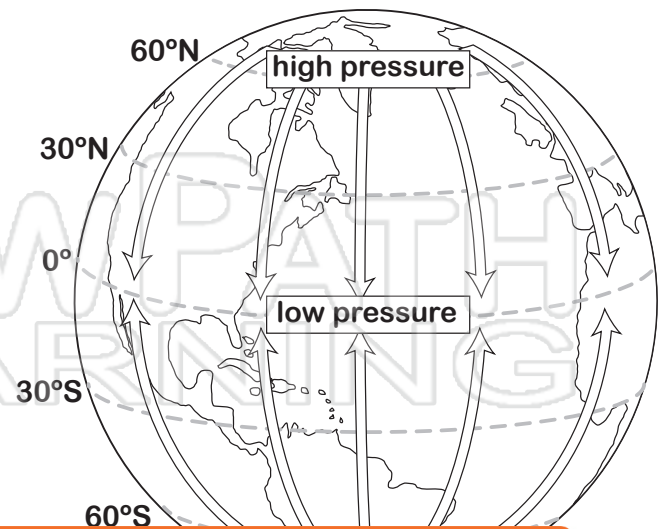
Earth's Atmosphere

Name _____ Class _____ Date _____

Properties of Earth's Atmosphere

Air Pressure

Earth's **atmosphere** has **mass** and **weight** because it contains gaseous elements that have mass and weight. The force that gases in the atmosphere exert on a surface is called **air pressure** or **atmospheric pressure**.



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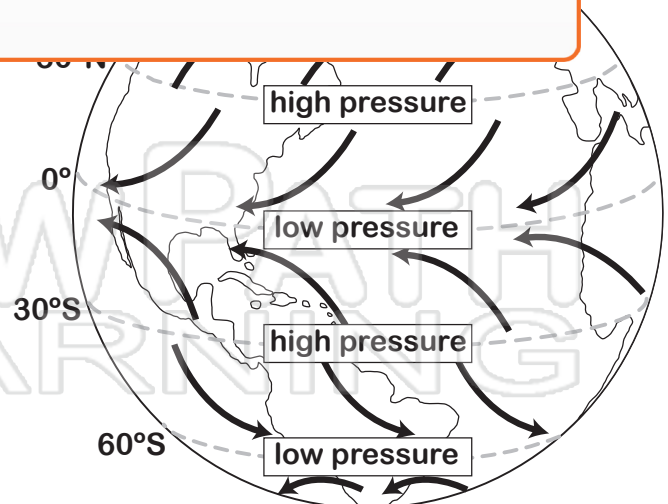
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Type

The winds that blow from 30° latitude (north and south) and in a westerly direction are called the **trade winds**.

The **westerlies** are winds that blow from the southwest to the northeast from 30° to 60° latitude (north and south).

The **easterlies** are winds that blow toward the west from the poles to 60° latitude (north and south).





Earth's Atmosphere

Name _____ Class _____ Date _____

Label the diagram below. Describe the different layers of atmosphere.



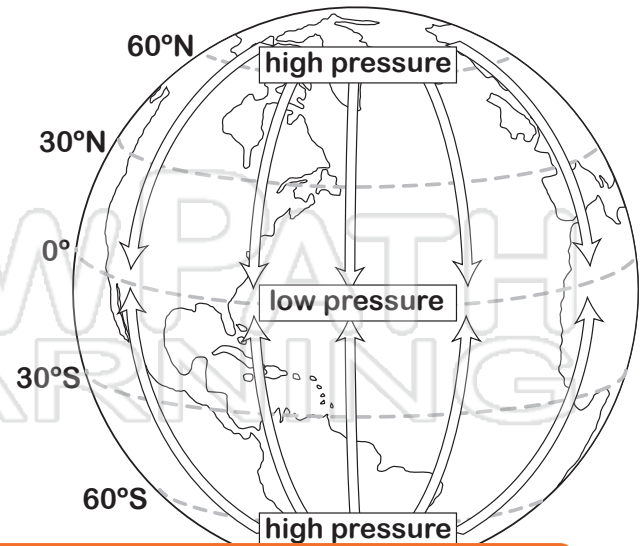


Earth's Atmosphere

Name _____ Class _____ Date _____

Describe the properties of Earth's atmosphere.

Air Pressure



60°N

30°N

0°

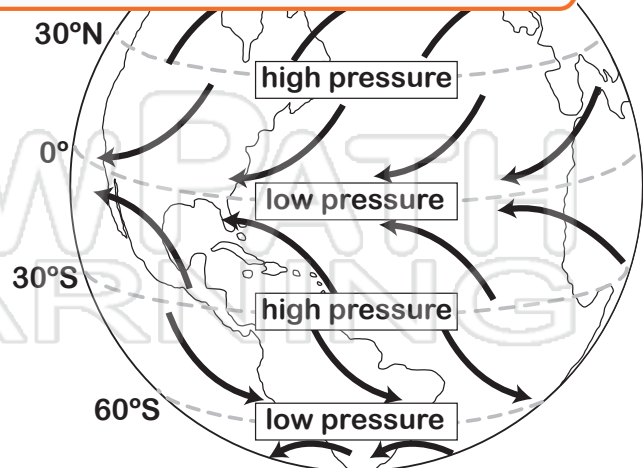
30°S

6

Type

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Earth's Atmosphere

Answer Key Example

Label the diagram below. Describe the different layers of atmosphere.

The outermost layer of Earth's atmosphere. Only very light gases, like hydrogen, helium and oxygen molecules are found here.

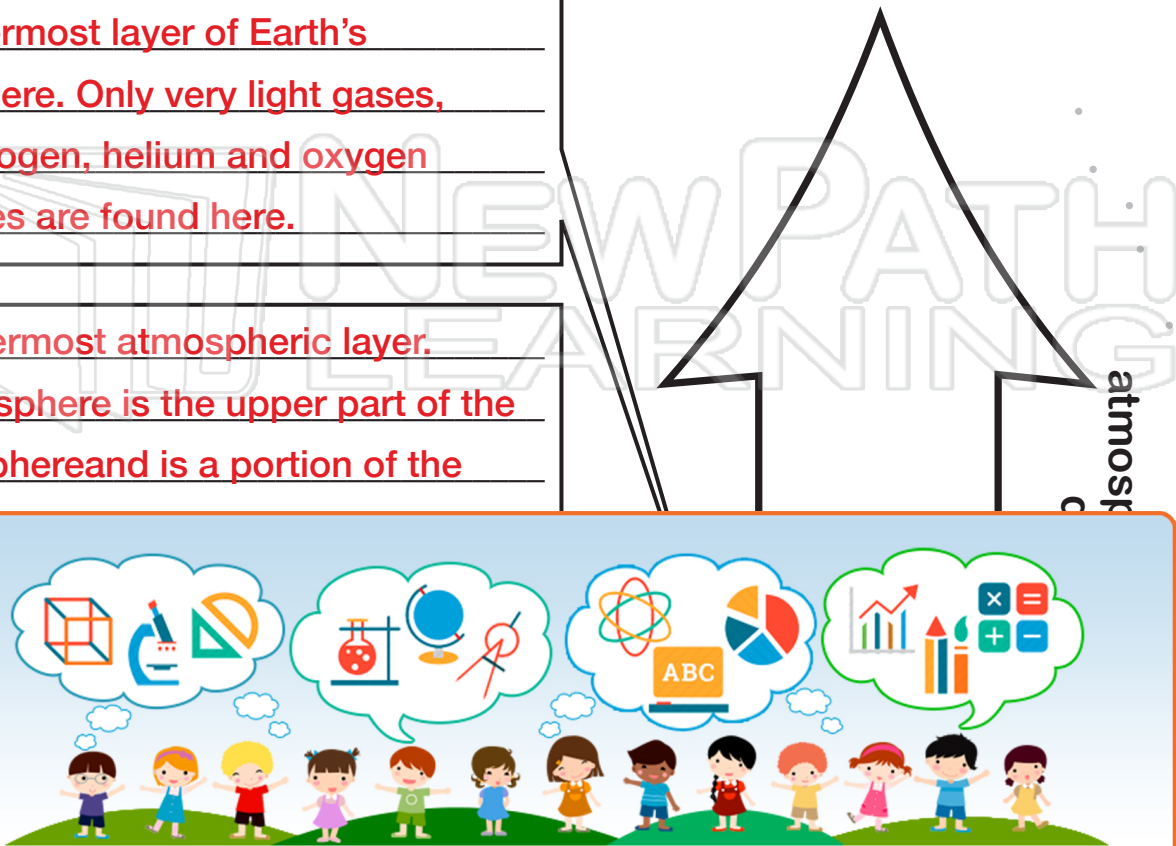
The uppermost atmospheric layer. The ionosphere is the upper part of the thermosphere and is a portion of the

atmosphere
form

Mesosphere
in the

The layer of the atmosphere in which we live. Oxygen, nitrogen, carbon dioxide, water vapor, pollution and weather are found in this layer.

The layer of the atmosphere in which we live. Oxygen, nitrogen, carbon dioxide, water vapor, pollution and weather are found in this layer.



mesosphere

-93° C

50 km

stratosphere

10 km

troposphere

-52° C



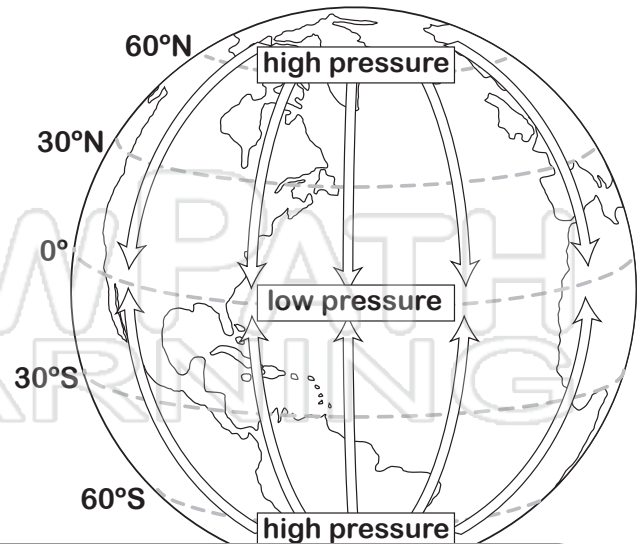
Earth's Atmosphere

Answer Key Example

Describe the properties of Earth's atmosphere.

Air Pressure

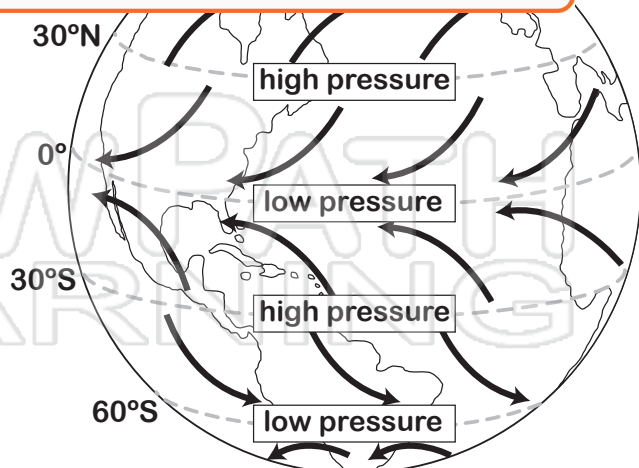
Earth's atmosphere has mass and weight. The force that gases in the atmosphere exert on a surface is called air pressure or atmospheric pressure.



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Trade winds blow from 30° latitude (north and south) in a westerly direction. Westerlies are winds that blow from the southwest to the northeast from 30° to 60° latitude (north and south). Easterlies blow toward the west from the poles to 60° latitude (north and south).





Name _____ Class _____ Date _____

1

A mixture of **gases**, including oxygen, nitrogen, water, and others, that **surrounds** the **earth** is called the _____.

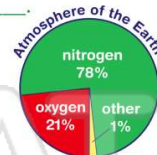
- A biosphere
- B atmosphere
- C ecosphere
- D stratosphere



2

The most abundant gas in the earth's atmosphere comes from volcanoes and the decay of dead plants and animals. The **most abundant** gas in the earth's atmosphere is _____.

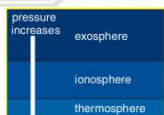
- A oxygen
- B carbon dioxide
- C hydrogen
- D nitrogen



3

The force that gases in the atmosphere exert on a surface is called **air pressure** or **atmospheric pressure**. In the atmosphere, where is the **air pressure** greatest?

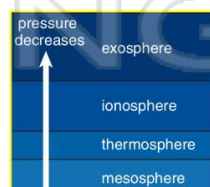
- A near sea level
- B on top of Mt. Everest



4

Atmospheric pressure **decreases** with _____.

- A longitude
- B latitude
- C altitude



5

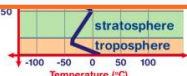


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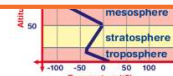
7

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- B mesosphere
- C stratosphere
- D troposphere



- B mesosphere
- C stratosphere
- D troposphere



9

What is the benefit of the **ozone layer** in the stratosphere?

- A It keeps the sun's heat near the surface.
- B It absorbs ultraviolet radiation.
- C It protects the life that lives on the earth's surface from ultraviolet radiation.
- D All of the above are true.



10

The **ionosphere** radiates energy in the form of different colors which can be seen near the poles. Depending on the hemisphere, this light display is called the **aurora borealis** (northern lights) and **aurora australis** (southern lights). The ionosphere is the upper part of the _____.

- A troposphere
- B stratosphere
- C mesosphere
- D thermosphere





Name _____ Class _____ Date _____

1

A mixture of **gases**, including oxygen, nitrogen, water, and others, that **surrounds** the **earth** is called the _____.

- A biosphere
- B atmosphere
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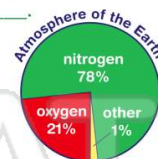


B

2

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- A oxygen
- B carbon dioxide
- C hydrogen
- D nitrogen

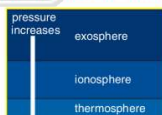


D

3

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- A near sea level
- B on top of Mt. Everest

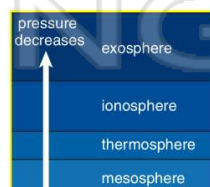


A

4

Atmospheric pressure **decreases** with _____.

- A longitude
- B latitude
- C altitude



C

5



A

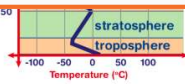
PREVIEW

7

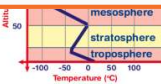
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C

- B mesosphere
- C stratosphere
- D troposphere



- B mesosphere
- C stratosphere
- D troposphere



9

What is the benefit of the **ozone layer** in the stratosphere?

- A It keeps the sun's heat near the surface.
- B It absorbs ultraviolet radiation.
- C It protects the life that lives on the earth's surface from ultraviolet radiation.
- D All of the above are true.



D

10

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- A troposphere
- B stratosphere
- C mesosphere
- D thermosphere



D



Name _____ Class _____ Date _____

1

The **energy** from the sun is transferred to the earth as _____.

- A balls of heat
- B solar wind
- C electromagnetic radiation
- D the northern lights



2

Some heat in the atmosphere is transferred when two objects touch each other. This heat always **moves** from the **warmer object to the colder object** until both objects are **equal** in temperature. The transfer of heat energy from one object to another by physical contact is called _____.

- A convection
- B conduction
- C convention
- D contrition



3

Most of the heat energy that is in the atmosphere is transferred by **convection**, which is _____.

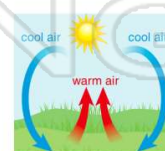
- A moving currents of air
- B precipitation falling to earth



4

As the **air** at the surface of the earth is **warmed**, in which **direction** does it move?

- A horizontally across the surface and is distributed evenly
- B around because of wind that blows hot air
- C up because it is less dense and eventually



5



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7

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- C convection, burning fossil fuels, and conduction
- D radiation, convection, and conduction

inside the house

- C the house gives off electromagnetic radiation
- D the sun's energy is reflected off the house

9

The earth's surface absorbs the sun's energy and heats up. At night, the warm earth gives off heat into the atmosphere which escapes into space. However, the accumulation of carbon dioxide and other gases in the atmosphere **trap heat** nearer the earth. Scientists call this process _____.

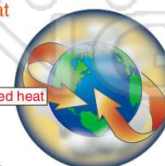
- A the oven effect
- B the greenhouse effect
- C polar ice melting
- D global warming



10

Some scientists have studied the earth's present climate and have concluded that the accumulation of carbon dioxide from the burning of fossil fuels has **considerably increased** greenhouse gases. If this increase **continues**, what **outcome** might be expected?

- A rising average global temperatures
- B melting of polar ice caps
- C rising sea levels
- D all of the above might occur





Name _____ Class _____ Date _____

1

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- A balls of heat
- B solar wind
- C electromagnetic radiation
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2

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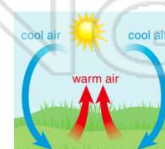
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4

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- C up because it is less dense and eventually



5



PREVIEW

7

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- C convection, burning fossil fuels, and conduction
- D radiation, convection, and conduction

inside the house

- C the house gives off electromagnetic radiation
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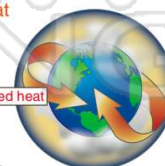
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- D all of the above might occur





Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Climate

Air mass

Atmosphere

Cirrus cloud

Atmospheric pressure

Chlorofluorocarbons

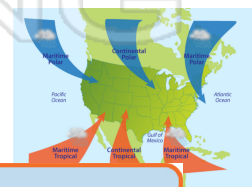
Biome

Conduction

1. _____ - the transfer of heat energy from the contact of one object to another



2. _____ - a huge body of air that has basically the same temperature and amount of moisture throughout



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7. _____ - thin, wispy cloud composed of ice crystals which form at very high altitudes in the atmosphere



8. _____ - the average weather of a region over an extended period of time





Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Climate

Air mass

Atmosphere

Cirrus cloud

Atmospheric pressure

Chlorofluorocarbons

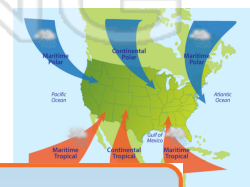
Biome

Conduction

1. conduction - the transfer of heat energy from the contact of one object to another



2. air mass - a huge body of air that has basically the same temperature and amount of moisture throughout



3. atm



4. atm

a surf

5. bio

climat

6. chl

to bre

PREVIEW

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7. cirrus cloud - thin, wispy cloud composed of ice crystals which form at very high altitudes in the atmosphere



8. climate - the average weather of a region over an extended period of time

