

Sprint Break TCAP Practice-6th Grade-Standards 6.ESS2.2 (Question 1-4) and 6.ESS2.6 (Questions 5-6)

Refer the following information to answer the adjoining questions.

Information

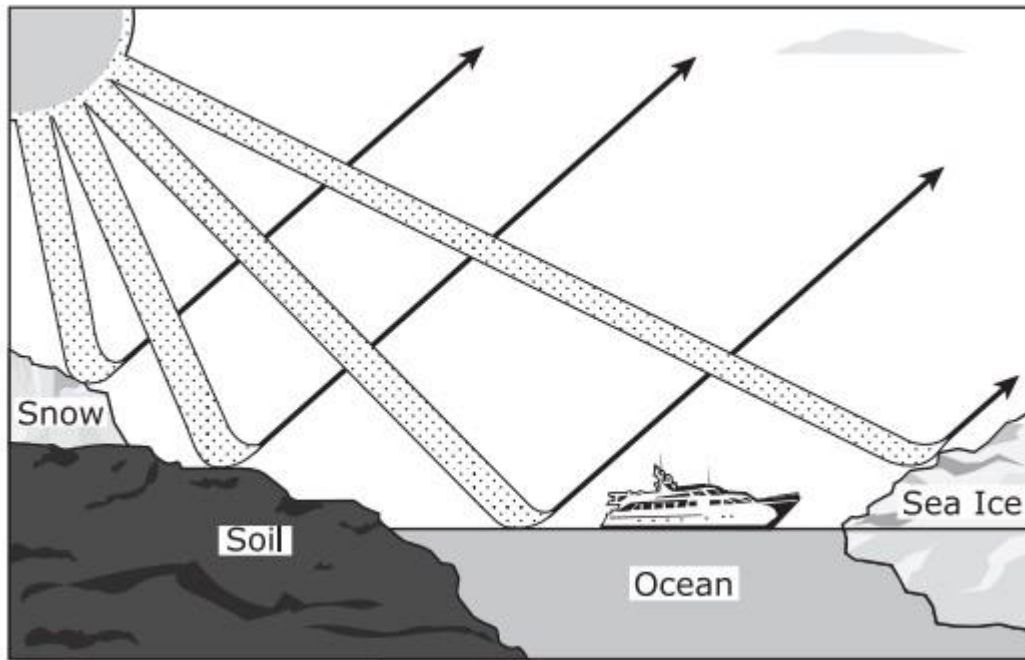
Glaciers – Part 1

Scientists conducting research in Antarctica want to learn how ocean currents form below sea ice, even when there is little sunlight. The scientists know that temperature differences can help cause ocean current formation. The table shows the amount of light Antarctica receives during the summer and winter.

Hours of Sunlight in Antarctica

Season	Hours of Sunlight
Winter	Less than 5
Summer	20 or more

The scientists measure how much sunlight is reflected off different surfaces in Antarctica. The amount of light that reflects off a surface is called the albedo. A surface that reflects all sunlight that reaches it has 100% albedo. A surface that does not reflect light at all has 0% albedo; all the sunlight reaching the surface is absorbed. The diagram shows the albedo of different surfaces in Antarctica.



Surface Albedo

Surface	Albedo (percentage reflected)	Percentage Absorbed
Snow	90%	10%
Soil	20%	80%
Ocean	6%	94%
Sea Ice	60%	40%

1

Which source of thermal energy is responsible for melting the sea ice?

- A The ocean heats the sea ice through chemical energy transfer.
 - B The wind heats the sea ice through mechanical energy transfer.
 - C The sun heats the sea ice through radiation energy transfer.
 - D The sea salt heats the ice through electrical energy transfer.
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2

Which statement correctly compares the albedo of different surfaces?

- A Snow absorbs more thermal energy than ocean water because it has a higher albedo than ocean water.
 - B Soil absorbs more thermal energy than sea ice because it has a higher albedo than sea ice.
 - C Ocean water absorbs less thermal energy than soil because it has a lower albedo than soil.
 - D Sea ice absorbs less thermal energy than ocean water because it has a higher albedo than ocean water.
-

3

Which statement about the albedo of ocean water and sea ice in the summer is correct?

- A The low albedo of ocean water means the heated water will sink and form ocean currents.
 - B The albedo of sea ice is lower than the albedo of ocean water, leading to the melting of sea ice.
 - C Sea ice absorbs less radiation, making it warmer than ocean water.
 - D Ocean water absorbs more radiation and is warmer than sea ice.
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4

How will a decrease in average summer sea ice affect the mixing of surface water and deep ocean currents?

- A More sunlight will be absorbed, which will heat the surface water and increase the chance that surface water will mix with deep water.
 - B Less sunlight will be absorbed, which will cool the surface water and increase the chance that surface water will mix with deep water.
 - C More sunlight will be absorbed, which will heat the surface water and reduce the chance that surface water will mix with deep water.
 - D Less sunlight will be absorbed, which will cool the surface water and reduce the chance that surface water will mix with deep water.
-

Read the passage below and answer the questions that follow.

How are Human Activities Affecting Earth's Climate?

Greenhouse Effect The sun warms Earth's surface, and the heat is radiated back through Earth's atmosphere to space as infrared waves. The atmosphere keeps Earth's surface warm through the greenhouse effect. Greenhouse gases such as carbon dioxide, methane, and water vapor absorb the heat leaving Earth's surface. They make up only 1 percent of the atmosphere. Levels of Greenhouse Gases Many human activities are increasing the level of greenhouse gases in the atmosphere. This increase is causing global temperatures to rise.



5

According to the passage what helps keep the energy from the sun from escaping back into space?

- A Infrared Waves
 - B The Atmosphere
 - C Rising Sea Levels
 - D The Land
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Use the information in the passage and your knowledge of Earth's climate to answer the following questions.

The Greenhouse Effect

A greenhouse stays warm inside, even during the winter. In the daytime, sunlight shines into the greenhouse and warms the plants and air inside. At nighttime, it is colder outside, but the greenhouse stays warm inside. That is because the glass walls of the greenhouse trap the Sun's heat.

The greenhouse effect works much the same way on Earth. Gases in the atmosphere, such as carbon dioxide, trap heat just like the glass roof of a greenhouse. These heat-trapping gases are called greenhouse gases.

During the day, the Sun shines through the atmosphere. Earth's surface warms up in the sunlight. At night, Earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere. That is what keeps our Earth a warm and cozy 58°F (14°C) on average.

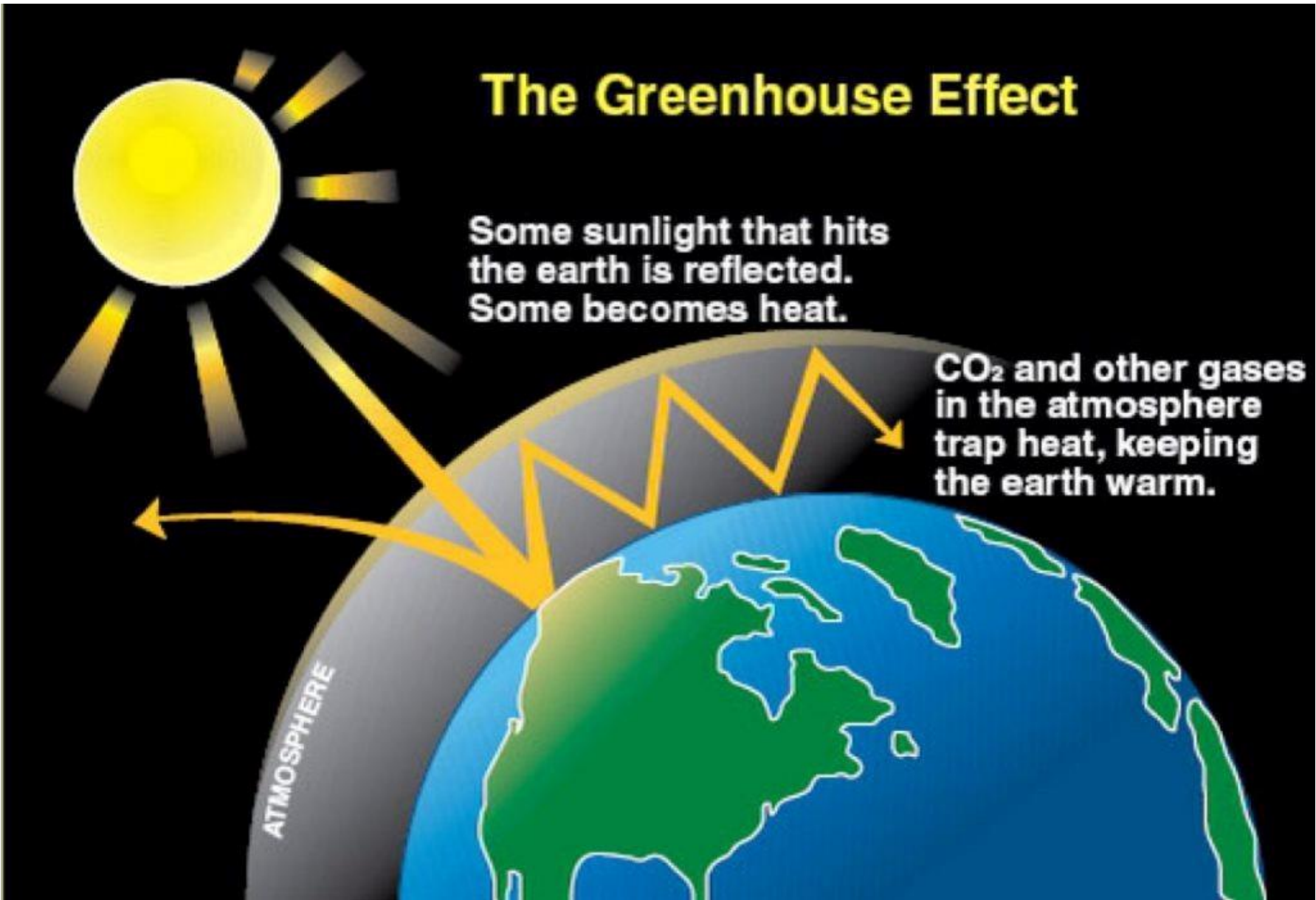
The temperature of the Earth is slowly increasing. This is called Global Warming. Global Warming is a contributing factor to Climate Change.

The Greenhouse Effect

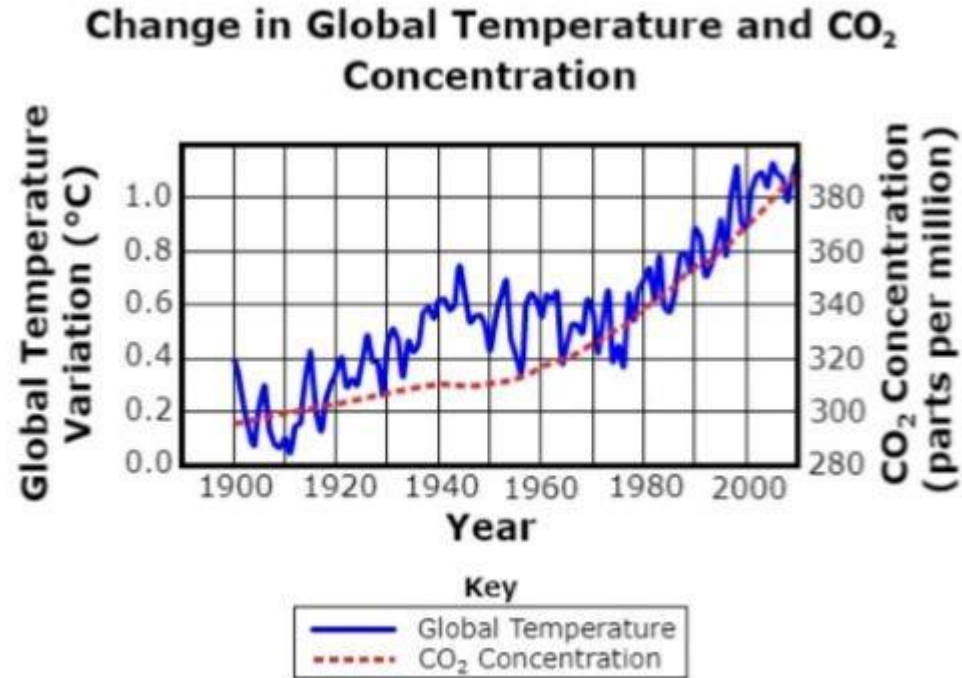
Some sunlight that hits the earth is reflected. Some becomes heat.

CO₂ and other gases in the atmosphere trap heat, keeping the earth warm.

ATMOSPHERE



The graph below shows how Earth's average global temperature and CO₂ concentration has changed from 1900 to 2015.



What is the relationship between global temperature and the concentration of CO₂ in the atmosphere?

Answer Key

1. Correct Answer: C — The sun heats the sea ice through radiation energy transfer.

Standard Alignment: 6.ESS2.2

Students must understand that the **sun is the primary source of energy** for Earth and that heat transfer from the sun occurs through **radiation**, which affects ocean currents and ice melt.

Rationale:

Radiation is the only form of energy transfer that can travel through space. The sun warms Earth's surface—including sea ice—and plays a major role in driving temperature differences that later produce ocean currents.

2. Correct Answer: D — Sea ice absorbs less thermal energy than ocean water because it has a higher albedo.

Standard Alignment: 6.ESS2.2

Students compare the **albedo** (reflectivity) of surfaces and how it influences temperature differences that help drive ocean currents.

Rationale:

Surfaces with **higher albedo** (like ice) reflect more sunlight and stay cooler.

Surfaces with **lower albedo** (like ocean water) absorb more heat.

This difference impacts water temperature and density, which are key drivers of ocean circulation.

3. Correct Answer: D — Ocean water absorbs more radiation and is warmer than sea ice.

Standard Alignment: 6.ESS2.2

Rationale:

Dark surfaces (ocean water) absorb more energy.

Lighter surfaces (sea ice) reflect more energy.

This difference explains why open ocean heats more than ice during summer—again contributing to density-driven movement of water.

4. Correct Answer: C — More sunlight will be absorbed, heating the surface water and reducing mixing with deep water.

Standard Alignment: 6.ESS2.2

Rationale:

Less sea ice → more exposed ocean → more sunlight absorbed → warmer surface water.

Warm water is **less dense**, so it stays near the surface and does **not mix easily** with the colder deep water.

Students should recognize that mixing is driven by **temperature and density differences**.

Questions 5–6 (Standard 6.ESS2.6)

5. Correct Answer: B — The Atmosphere

Standard Alignment: 6.ESS2.6

Students examine how **greenhouse gases** in the atmosphere trap heat and help maintain Earth's temperature.

Rationale:

Greenhouse gases absorb infrared radiation and keep Earth warm—similar to how a greenhouse traps heat. Students must understand that without this natural process, Earth would be too cold for life.

6. Correct Answer: Global temperature increases as CO₂ concentration increases.

Standard Alignment: 6.ESS2.6

Students interpret graphs showing climate data to identify relationships between human activities (CO₂ emissions) and global temperature changes.

Rationale:

The graph demonstrates a clear upward trend in both CO₂ levels and global temperature from 1900–2015. Recognizing this pattern is essential to understanding **human-driven climate change**.