

# Activity #6

## Steps Along the Journey: Global Warming



### 1. Introduction

In this activity, you will begin your *Breathe: It's Your Planet — Love It! A Leadership Journey* Air Care Team Plan in which Cadettes discover, connect, and take action.

### 2. Materials

- Print pages 2–7 for each Cadette.
- Upon completion of this, the final activity in the series, please complete the [GGTM User Survey at https://www.surveymonkey.com/s/8FZHB6M](https://www.surveymonkey.com/s/8FZHB6M). The participation patches will be shipped to you for your troop.

### 3. Breathe

Troop Leader:

- 3.1. Get out your book: *Breathe: It's Your Planet — Love It! A Leadership Journey*, a copy of the questions and answers from GGTM Activity #1: The Goldilocks Question, and GGTM Activity #5: The Greenhouse Effect.
- 3.2. It is time to **link** what you have learned to your *Breathe* awards along the journey.
- 3.3. You are now **AWARE** of the world's air quality and **ALERT** to global warming and ready to **AFFIRM** support for a plan of action with your Air Care Team (ACT).
- 3.4. Where do you go from here? How do we know what we know about global warming? Why do we care about global warming? As leaders, what are the next steps to inspire and educate others?
- 3.5. Read the Introduction instructions below.

Now that we have finished all the activities, we are going to work on completing some of the steps in two of the Breathe Journey awards: Aware and Alert. As you have worked your way through the GGTM activities, you have learned about atmospheres and land formations, their importance, and why they are the way they are. Girls will apply the knowledge they gained to the Journey work!

In the grid on the following pages, you will see the steps in both the Aware and Alert awards in the first column. In the second column, you will see which GGTM activity completed the step or what still needs to be completed. Now, let's use what we have learned to complete the remainder of the steps. This is where the girls and their troop will be able to develop their plan for the Air Care Team.

The Girls Go to Mars activities do not fully complete the journey, but they help you complete a significant portion of it. As you can see, some of the steps in both the awards need to be completed outside of the GGTM activities, for example the Air Log (step 1, Aware Award). By completing GGTM, you are also choosing global warming as your air issue to act on together.

We hope you enjoyed the GGTM activities and find the Breathe correlations helpful in completing the Journey.

## 4. REVIEW and BACKGROUND

From *Terrestrial Planet Atmospheres: Reading Chapter 10*: <http://tinyurl.com/ltjk2d6>

### What Do We Know?

#### The Greenhouse Gas Effect and Light Energy

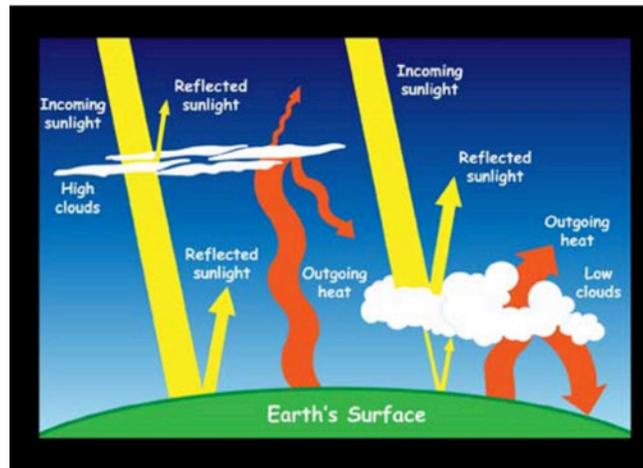


Image Credit: NASA

#### Girls Discover:

Activity #5: Water vapor and CO<sub>2</sub> absorb infrared energy and increase the temperature of the air!

“Earth’s atmosphere absorbs the sun’s hot, ultraviolet\*\* rays and helps reduce temperature extremes between night and day. Essentially, it serves as a ‘blanket’ for Earth, protecting life on the planet.” *Breathe. It’s Your Planet—Love It!* 33.

Absorbed by land, oceans, and vegetation at the surface of the Earth, visible light\*\* is changed into heat and comes back out in the form of infrared\*\* energy.

\*\*refer to: Activity #5, Electromagnetic Spectrum Chart

**Girls Discover:**

Too Hot, Too Cold, or Just Right? The Goldilocks Question again!

Review what you learned in Activity #2.

| <b>Atmospheric Gas</b>            | <br><b>Venus</b> | <br><b>Earth</b> | <br><b>Mars</b> |
|-----------------------------------|---|--|--|
| Carbon Dioxide (CO <sub>2</sub> ) | 96.5%   | 0.03%  | 95%  |
| Nitrogen (N <sub>2</sub> )        | 3.5%  | 78%  | 2.7%   |
| Oxygen (O <sub>2</sub> )          | Trace   | 21%  | 0.13%  |
| Argon (Ar)                        | 0.007%  | 0.9%   | 1.6%   |
| Methane (CH <sub>4</sub> )        | 0   | 0.002%   | 0  |

Using that information and information in the table above:

1. What is the planet with MOST dense atmosphere?
2. Which is warmer, Earth or Mars?
3. Why is Mars so very cold?

## Girls Connect:

### Evidence of Global Warming: Earth

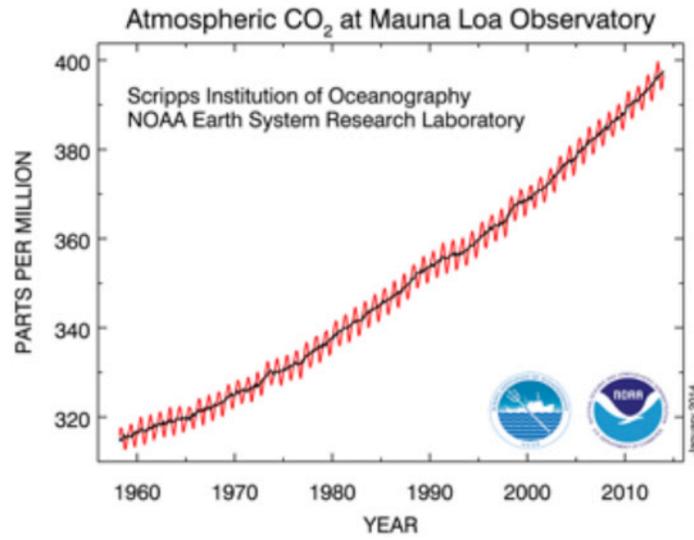


Image Credit: ESRL/NOAA

“Over time, those greenhouse gases have been on the rise, leading to gradual warming of Earth’s temperatures, both on land and in the oceans. This temperature rise, and the various climate changes resulting from it, is known as global warming or climate change.” *Breathe. It’s Your Planet—Love It!* 33.

Look at the graph above and describe the relationship between the levels of CO<sub>2</sub> and what you have learned about temperature change over the past 50 years.

**Girls Connect:**

**Natural and Human Sources of Carbon Dioxide**

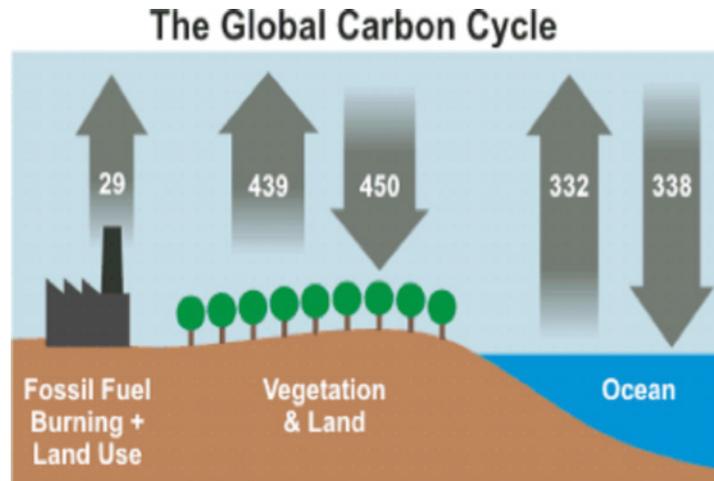


image Credit: Intergovernmental Panel on Climate Change

Do the math! The numbers on the arrows represent gigatons (a really big number!) per year of CO<sub>2</sub>.

Total the up↑ arrows =

Total the down↓ arrows =

1. Are the amounts for the up and down arrows equal?

Are we in “balance”?

If not, which total (up or down) is larger?

2. Open your *Breathe* book to page 35 and read, “The Fossil in Fossil Fuels.” There are natural and human sources of increasing amounts of CO<sub>2</sub> in our atmosphere. Natural sources, like volcanoes, we cannot change.

Human sources of CO<sub>2</sub> released into our atmosphere we can change!

**Girls Take Action:**

What can we do to help?

Recall: Plants use CO<sub>2</sub> from the atmosphere as part of a process called photosynthesis.



## 5. "Breathe" Awards Along the Journey

Get together with your troop and start to make a plan! Look at the Background for ideas.



### AWARE

| Step  | Activity Description   | Completion Date |
|---|--|-----------------|
| 1. Keep an air log...   | You will do this independently in your troop meetings.   |                 |
| 2. Identify two experts who can guide you to greater air AWAREness.   | Today I talked to scientists; I watched videos where geologists, engineers and astronomers talked about Mars and other planets.  |                 |
| 3. Increase your AWAREness about the issues that impact Earth's air.  | In Activity #5 The Greenhouse Effect, you investigated how water vapor, one of several greenhouse gases, increases the temperature of Earth's air. Look at some evidence for global warming. Read some background information. |                 |
| 4. Decide the most important, personal reason you care about Earth's air. Explain why this reason matters to you and why it should matter to others. Share with your sister Cadettes. | <b>Complete your statement here:</b>   |                 |

## ALERT

| Step  | Meeting Date:       |
|---|---------------------|
| 1. With your Cadette team, choose global warming as your air issue to act on together.<br><br>Write a statement that explains why it's important to educate and inspire others on this issue. | Write a statement:  |
| 2. Decide whom to educate and inspire — this is your Air Care Team (ACT)! What group of people will join you? Parents? Teachers? Other Cadettes? Brownies?                                    | Air Care Team plan: |

## ALERT

| Step  | Planning  |
|---|---|
| 3. Decide what you will ask your Air Care Team to do. What is your action plan to educate and inspire?<br><br>(Brainstorm: <b>Girls Take Action</b> What Can We Do to Help Better Our Communities?) | Write a plan of action:                                 |
| 4. Decide how to reach your Air Care Team (ACT) to inspire them to act on your air issue.   | How to reach your Team:                                 |
| 5. Educate and inspire!   | Feel the rewards.... Happens outside our workshop time. |

## AFFIRM

| Step  | Take Action and Monitor Progress                                       |
|---|--|
| 1. Gather proof of progress.<br>2. Share the impact.<br>3. Reflect on efforts.<br>4. Affirm commitment. | Long-term goals that happen after the planning and action has started. |

## Answer Key

### Girls Discover:

Too Hot, Too Cold, or Just Right? The Goldilocks Question again!

### Review what you learned in Activity #2.

Using that information and information in the table above:

1. Planet with MOST Dense atmosphere?

*Venus*

2. Which is warmer, Earth or Mars?

*Earth*

3. Why is Mars so very cold?

*Mars receives just less than half the energy from the sun that Earth does. Mars has higher percentage of carbon dioxide, a greenhouse gas, yet it is much colder. Mars was once warmer. The loss of atmosphere has played a role in the climate change on Mars.*

### Girls Connect:

#### Evidence of Global Warming: Earth

“Over time, those greenhouse gases have been on the rise, leading to gradual warming of Earth’s temperatures, both on land and in the oceans. This temperature rise, and the various climate changes resulting from it, is known as global warming or climate change.” *Breathe. It’s Your Planet—Love It!* 33.

Look at the graph above and describe the relationship between the levels of CO<sub>2</sub> and what you have learned about temperature change over the past 50 years.

*The level of CO<sub>2</sub> has risen, and so has the temperature. The greenhouse gas is trapping heat, and global warming is occurring.*

### Girls Connect:

#### Natural and Human Sources of Carbon Dioxide

Do the math! The numbers on the arrows represent gigatons (a really big number!) per year of CO<sub>2</sub>.

Total the up↑ arrows =

*800*

Total the down↓ arrows =

*788*

1. Are the amounts for the up and down arrows equal?

*No*

Are we in “balance”?

*No*

If not, which total (up or down) is larger?

*Up. More CO<sub>2</sub> is going into the atmosphere than comes out of the atmosphere.*