

# Class Starters & Enders

## Making the Most of Instructional Time Five Minute Lessons

Class Starters and Enders help utilize the last minutes of class when a lesson ends but there is not enough time to start another, or for an interest approach at the beginning of class. Mini-lessons correlate to GPS in the programs areas below.

### Greenhouse Gases

**Program Areas:** Agriculture, Transportation, Engineering, Biotechnology, Technology, and Forestry

**Instructions:** Read the narrative and make notes of important points, answer questions, if provided, and be ready to discuss this topic.



Though all greenhouse gases are produced naturally, man-made sources of these materials – such as the burning of fossil fuels for gasoline in cars and smog made by industrial production – are increasing the amount of gases in the atmosphere as well.

#### What's a Greenhouse Gas?

You've probably heard of carbon dioxide, methane, water vapor, and hydrofluorocarbons in your science classes, and probably on the evening news too. These **greenhouse gases** trap heat in Earth's atmosphere, causing Earth's temperature to be higher than it would be if direct solar radiation were the only warming mechanism. This is known as the **greenhouse effect**, and it is thought to be a cause of **global warming**.

#### Carbon Dioxide

**Carbon dioxide** can enter the atmosphere naturally through the **carbon cycle** or through human activities, such as the burning of **fossil fuels**. When emitted naturally, billions of tons of atmospheric carbon dioxide are taken from the ocean and plants – sources referred to as **sinks** – and are sent back into the atmosphere by natural processes called **sources**. If the system is in balance, the amount of carbon dioxide entering and leaving the atmosphere is fairly equal. Human activities since the **Industrial**

**Revolution**, however, increased carbon dioxide concentrations in the atmosphere, so the balance is out of whack.

#### Methane

Like carbon dioxide, **methane** enters the atmosphere both naturally and through man-made processes. More than 50 percent of methane emissions are from human activities such as producing fossil fuels, burning **biomass**, and waste management. Agriculture has been blamed for much of the methane in the atmosphere – both rice and livestock production create methane, but scientific evidence debates the exact amount of this greenhouse gas put in the atmosphere because of these industries.

#### Nitrous Oxide

**Nitrous oxide** is made in soil and water, especially in tropical forests. It is also emitted during various agricultural practices, sewage treatment, fossil fuel **combustion**, and the production of adipic and nitric acids. New studies suggest nitrous oxide emission is the single most ozone-depleting substance, a title the gas could carry throughout the century.

#### Fluorinated Gases

Fluorinated gases such as chlorofluorocarbons and halons deplete **ozone** in the atmosphere. These are referred to as **high global warming potential**, or GWP, gases and are created from many industrial processes – aluminum production, semiconductor manufacturing, electric power transmission, and magnesium production, just to name a few.

#### Review Questions

1. Why are greenhouse gases problems for Earth?
2. What have human activities done to the balance of carbon dioxide emission and removal?
3. What agriculture industries are blamed for methane emissions?
4. Name two examples of fluorinated gases.
5. Where is nitrous oxide produced naturally?

#### Language Connection

*Define the following terms*

Biomass	Greenhouse Effect	Methane
Carbon Cycle	Greenhouse Gas	Nitrous Oxide
Carbon Dioxide	Global Warming	Ozone
Combustion	GWP Gas	Sinks
Fossil Fuels	Industrial Revolution	Sources

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