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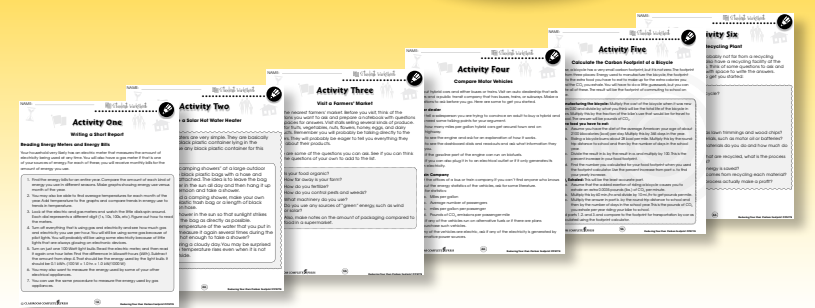
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Climate Change Has Your Footprint On It

1. Circle the word **TRUE** if the statement is TRUE or Circle the word **FALSE** if it is FALSE.

- a) The average temperature of Earth is rising.
TRUE FALSE
- b) Earth would have a perfect climate if there were no greenhouse effect.
TRUE FALSE
- c) Combustion is another word for burning.
TRUE FALSE
- d) Coal is a fossil fuel.
TRUE FALSE
- e) More carbon dioxide must be added to the atmosphere to reverse global climate change.
TRUE FALSE

2. Put a check mark (✓) next to the answer that is most correct.

- a) **The greenhouse effect traps**
 - A carbon
 - B gas
 - C heat
 - D light
- b) **Carbon dioxide molecules are made up of one carbon atom and two oxygen atoms. What is the chemical formula of carbon dioxide?**
 - A CO
 - B CO₂
 - C C₂O
 - D C₂O₂
- c) **All of these are produced when gasoline burns, except**
 - A heat
 - B water
 - C oxygen
 - D carbon dioxide



Climate Change Has Your Footprint On It

The **climate** of our planet is changing. Earth is getting warmer, and it will continue to heat up for the rest of your lifetime. The question has changed from, "Is this really happening?" to "What can we do to slow it down?" Read on to find what you can do.



Carbon is always traveling from place to place

Earth is warming because of an increase in the **greenhouse effect** of Earth's **atmosphere**. Have you ever been in a greenhouse? It is warmer inside a greenhouse than outside because the glass windows trap the sun's energy in the form of heat. The atmosphere works the same way because a few of the gases in the atmosphere work like greenhouse windows to trap heat.

The greenhouse effect is actually a *good* thing. Without it, the planet would be too cold to support life. What we have now is too *much* of a good thing. The amounts of greenhouse gases in the air have been increasing rapidly over the last hundred or so years causing **global** temperature to rise.

Carbon dioxide is an important greenhouse gas for two reasons: It is the one that is increasing the most, and it is increasing because of human activities. Carbon dioxide **molecules** are made of one **carbon atom** and two **oxygen atoms**, as shown by its chemical formula, **CO₂**. The carbon is not always part of CO₂. When it is on Earth's surface, it can be part of the **organic** molecules that plants and animals are made of. Carbon is always traveling from place to place and taking different forms in a process called the **carbon cycle**.



Climate Change Has Your Footprint On It

1. Write each word or group of words beside its meaning.

greenhouse effect fossil fuel carbon footprint CO₂ combustion

- a) _____ greenhouse gas emissions caused by your activities
- b) _____ burning
- c) _____ coal, oil, or natural gas
- d) _____ temperature increase caused by trapped heat
- e) _____ carbon dioxide formula

2. Put a check mark (✓) next to the answer that is most correct.

- a) **Which statement about climate change is correct?**
 - A Most greenhouse gases are given off by trees.
 - B Oxygen is the main greenhouse gas.
 - C Climate is changing because of human activities.
 - D Earth's temperature will soon return to normal.
- b) **Which statement about carbon footprints is correct?**
 - A Everyone has a carbon footprint.
 - B Only car owners have carbon footprints.
 - C Carbon footprints are expressed in tons of coal.
 - D Electricity use has no carbon footprint.
- c) **All of these add to the amount of CO₂ in the atmosphere, except**
 - A cooking with gas
 - B planting trees
 - C burning wood
 - D riding in a bus



Climate Change Has Your Footprint On It

3. Answer the questions in complete sentences. Describe two steps in the carbon cycle.

- a) _____

- b) _____

Extensions & Applications

- a) **Describe the result of the greenhouse effect in terms of heat and temperature change.**

- b) **Explain why a greenhouse and Earth's atmosphere both have a greenhouse effect. Explain what causes the greenhouse effect in both cases.**



Carbon Footprint Calculator

On this and the following page you can calculate your own, personal carbon footprint. The different parts of your footprint are arranged in the same order as in the chapters of this book. The calculations will be done in pounds per year (lbs./yr.) of CO₂ emitted because the numbers will be easier to work with. When everything is added up at the end, you can then convert lbs./yr. to tons/yr. If you don't understand how to do the math, be sure to ask for help.

Footprint at Home:

Find the energy bills for your household. You probably know which of the kinds of energy listed below are used in your home. Each kind of energy is measured differently: electricity in kilowatt-hours (kWh), gas in therms, hundreds of cubic feet, or gallons, heating oil in gallons, and coal in tons. Find the part of the bill that lists the amount of energy used in terms of these units. If the bills do not give average monthly usage, take the average of several months scattered throughout the year. The numbers at the end of each equation are called conversion factors. Multiplying by them changes energy units to pounds of CO₂ and months to years.

Electricity

$$\frac{(\text{ kWh/mo})}{(\text{ people in home})} \times (21) = \frac{\text{ lbs.}}{\text{ yr.}}$$

Gas

$$\frac{(\text{ therms, gal. or } 100 \text{ ft}^3/\text{mo})}{(\text{ people in home})} \times (132) = \frac{\text{ lbs.}}{\text{ yr.}}$$

Oil

$$\frac{(\text{ gal./mo})}{(\text{ people in home})} \times (290) = \frac{\text{ lbs.}}{\text{ yr.}}$$

Coal

$$\frac{(\text{ tons})}{(\text{ people in home})} \times (21) = \frac{\text{ lbs.}}{\text{ yr.}}$$

Total emissions due to household energy _____ **pounds/year**

Food Footprint:

If you eat meat every meal, write 9000 in the space to the right. Write 8300 if you eat meat two meals a day, 7500 if you eat meat one meal a day, 6800 if you never eat meat, and 4600 if you don't eat eggs, or dairy products.

If you buy only organic produce, subtract 600 pounds.

If you only buy locally grown food, subtract another 400 pounds.

Total emissions due to food purchases _____ **pounds/year**



Crossword Puzzle!

Across

- Two atoms of oxygen and one atom of carbon make one carbon dioxide _____.
- The element with the symbol C.
- Carbon dioxide emissions caused by your activities.
- Going to work while staying at home.
- Chemicals that kill bugs on crops.

Down

- Its formula is CO₂.
- Weed killer.
- They don't eat meat.
- Carbon going in a circle.
- Our activities are changing Earth's _____.
- Coal and oil are _____ fuels.
- Cells that turn sunlight directly into electricity.
- Smaller than a molecule.
- The unit in which natural gas is sometimes measured.
- It's natural, it's a fossil fuel, and it is a _____.

Word List		
atom	climate	pesticides
carbon	fossil	photovoltaic
carbon cycle	gas	telecommuting
carbon dioxide	herbicide	therm
carbon footprint	molecule	vegetarians



Comprehension Quiz

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Part A

Circle the word **TRUE** if the statement is TRUE or Circle the word **FALSE** if it is FALSE.

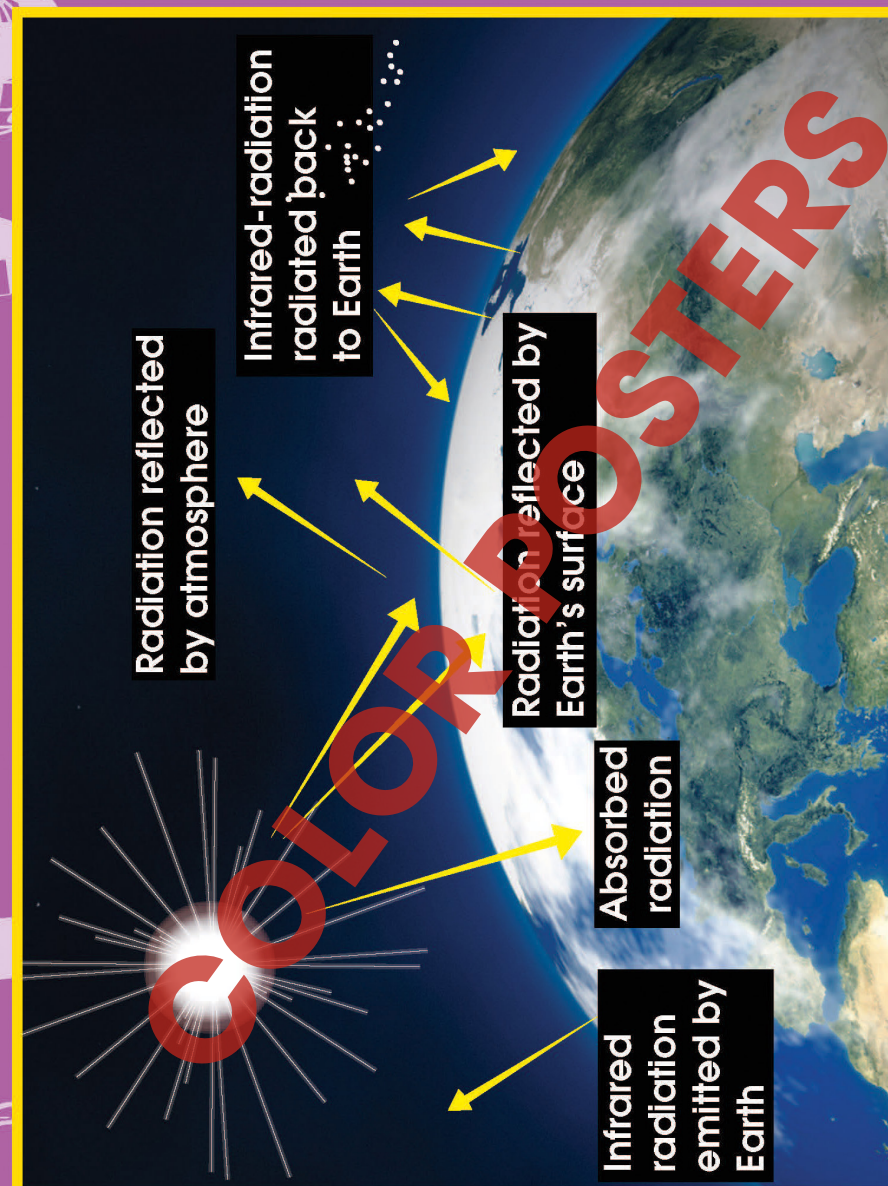
- Human activities are changing Earth's climate.
TRUE **FALSE**
- Double pane windows will reduce the amount of energy used to heat and cool a home.
TRUE **FALSE**
- Meat eaters have a smaller carbon footprint than vegetarians.
TRUE **FALSE**
- Trains produce more CO₂ per passenger-mile than planes.
TRUE **FALSE**
- Buying new clothing increases your carbon footprint more than buying second-hand clothing.
TRUE **FALSE**
- Photosynthesis removes CO₂ from the atmosphere.
TRUE **FALSE**
- The carbon footprint of the average American is smaller than that of the average European.
TRUE **FALSE**

Part B

Put a check mark (✓) next to the answer that is most correct.

- All of these energy sources release CO₂ into the atmosphere, *except*
 - A oil
 - B coal
 - C natural gas
 - D hydroelectric
- Which of these changes will reduce your carbon footprint at home?
 - A taking baths instead of showers
 - B keeping the house heated to 70 °F instead of 65 °F
 - C using fluorescent light bulbs instead of standard bulbs
 - D washing half loads instead of full loads in the dishwasher

The Greenhouse That Is Earth



Notice that light comes easily through the glass and the atmosphere. When the light strikes the surface, the surface heats up and gives off heat. In both cases, some of the heat is trapped because heat doesn't pass through the glass or the atmosphere as easily as the light got in.

NAME: _____

After You Read 



Climate Change Has Your Footprint On It

3. Answer the questions in complete sentences. Describe two steps in the carbon cycle.

- a) _____

- b) _____

Extensions & Applications

a) Describe the result of the greenhouse effect in terms of heat and temperature change.

EASY MARKING

b) Explain why a greenhouse and Earth's atmosphere both have a greenhouse effect. Explain what causes the greenhouse effect in both cases.

3.

(Answers will vary. Order may vary.)

- a) Combustion converts carbon compounds to carbon dioxide.
- b) Photosynthesis converts carbon dioxide to carbon compounds.

Extensions & Applications

- a) A material traps heat and causes the temperature to rise.
- b) In a greenhouse the glass traps the heat, and in the atmosphere, CO₂ and other gases trap the heat.

Across

1. molecule
5. carbon
6. carbon footprint
10. telecommuting
12. pesticides

Down

2. carbon dioxide
3. herbicide
4. vegetarians
5. carbon cycle
6. climate
7. fossil
8. photovoltaic
9. atom
10. therm
11. gas



11

18