

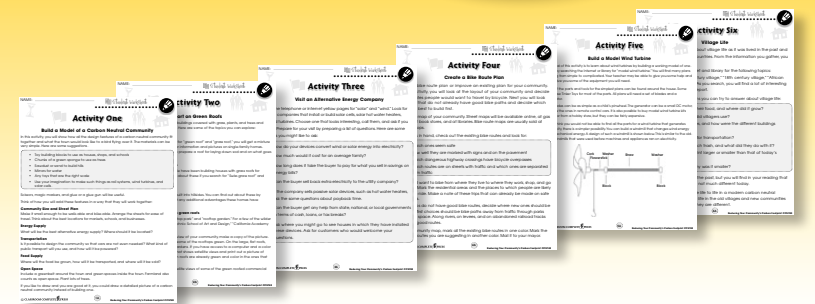
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Climate is Changing, and So Must We

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 dropping.
TRUE FALSE
- b) Wind turbines convert wind energy to electric energy.
TRUE FALSE
- c) Greenhouse gases trap heat.
TRUE FALSE
- d) Burning fossil fuels releases oxygen into the atmosphere.
TRUE FALSE
- e) Carbon footprints are caused by athlete's foot.
TRUE FALSE
- f) Natural gas is a fossil fuel.
TRUE FALSE

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

a) Which of these cause sea levels to rise?

- A Melting polar ice caps.
- B Falling global temperature.
- C Earth rotating on its axis.
- D Building hydroelectric dams.

b) Which of these is a greenhouse gas?

- A helium
- B oxygen
- C carbon dioxide
- D sodium chloride

c) Which of these activities removes greenhouse gas from the atmosphere?

- A Driving a car.
- B Planting trees.
- C Burning leaves.
- D Generating electricity.



Climate is Changing, and So Must We

The Maldives is the name of a small island nation in the Indian Ocean. The population of these 26 low-lying islands is only about the size of a small American city. In 2009, Maldives government decided to spend over \$1 billion to build 155 **wind turbines** that will generate all the electricity the country needs. Why would such a small country spend so much money on something they could get along without?



Maldives wind farm

The answer has to do with **global climate change**. First we must look at the causes of climate change and the possible dangers. Earth is warm enough for us to live here because of **greenhouse gases** in the **atmosphere**. These gases allow sunlight in, but they trap heat. They are called greenhouse gases because they work like the glass of greenhouse windows. The windows trap heat and make the air inside warm enough to grow flowers and vegetables in the winter.

The problem is that the amount of greenhouse gases in the atmosphere is increasing rapidly. This is causing Earth's temperature to rise. As Earth warms, ice at the North and South Poles are melting, causing sea levels to rise. Higher temperature also changes the **habitats** of animals, making it hard for some of them to survive. If we don't slow down the temperature increase soon, we may be one of the animals threatened.

STOP Explain, in terms of light and heat, how greenhouse gases affect the atmosphere.

There is something we can do. The greenhouse gas that is causing most of the climate change is **carbon dioxide** (CO₂). CO₂ is increasing because it is produced when we burn fuel, and we are burning more and more fuel. Most of this fuel is what we call **fossil fuels**, which are oil, coal, and **natural gas**.



Climate is Changing, and So Must We

1. Complete each sentence with a word from the list. Use a dictionary to help you.

neutral turbine	oil footprint	electricity heat	gas coal
-----------------	---------------	------------------	----------

- a) The greenhouse effect traps _____.
- b) Emitting no carbon dioxide is called being carbon _____.
- c) _____, _____, and natural _____ are fossil fuels.
- d) A wind _____ is a windmill that generates _____.
- e) The amount of carbon dioxide your activities release into the atmosphere is your carbon _____.

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

- a) The island nation called the Maldives has a large carbon footprint.
TRUE FALSE
- b) An increase in greenhouse gases in the atmosphere is changing Earth's climate.
TRUE FALSE
- c) Greenhouses keep out heat that would kill the plants inside.
TRUE FALSE
- d) All animals will have an easier time surviving if Earth becomes warmer.
TRUE FALSE
- e) Global climate change threatens the existence of low-lying islands.
TRUE FALSE
- f) Burning fossil fuels can help remove greenhouse gases from the atmosphere.
TRUE FALSE



Climate is Changing, and So Must We

3. Answer the questions in complete sentences.

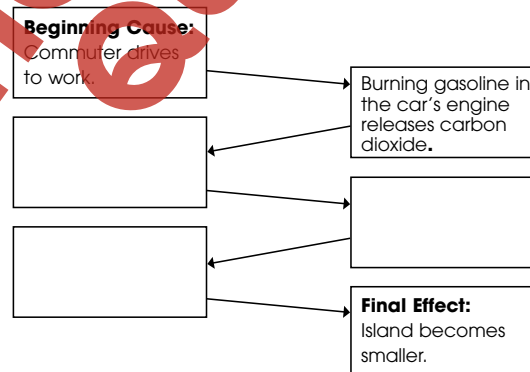
a) Explain how planting trees can help a community become carbon neutral.

b) Describe one method of generating electricity that contributes to global climate change.

c) Describe one method of generating electricity that does not contribute to global climate change.

Extensions & Applications

A commuter driving to work in a gasoline-powered car begins a series of cause-and-effect events that lead to a distant island becoming smaller. (Of course, one car is only a small part of the cause of the final result.) Use the graphic organizer to show the complete series of events. Each cause will have an effect, and that effect will then become the cause of the next event. The first step has been done for you.



See page 12 for Final Version Worksheet.



Carbon Footprint Calculator

On this page and the following page, you can calculate the carbon footprint of your community. You can think of your community as your city, town, neighborhood, or suburb. If you live in the country, you can calculate the footprint for your county. Whatever area you take to be your community, you will need to be able to find its population.

Because communities are so different and because there are so many factors that make up the footprint, you cannot expect the result to be perfectly accurate. It will be a fairly good estimate though, and it will probably be many thousands of tons of carbon dioxide. A ton equals 2,000 pounds, which is about the weight of a small car.

First you will need to find the **per capita** carbon footprint of your state. Per capita means per person. The per capita footprint is the share of the total footprint caused by the activities of the average person and is given in tons per year. Per capita footprints vary widely from state to state. We have divided the states into groups with high, medium, and low footprints. Look at the table below and find which group your state is in.

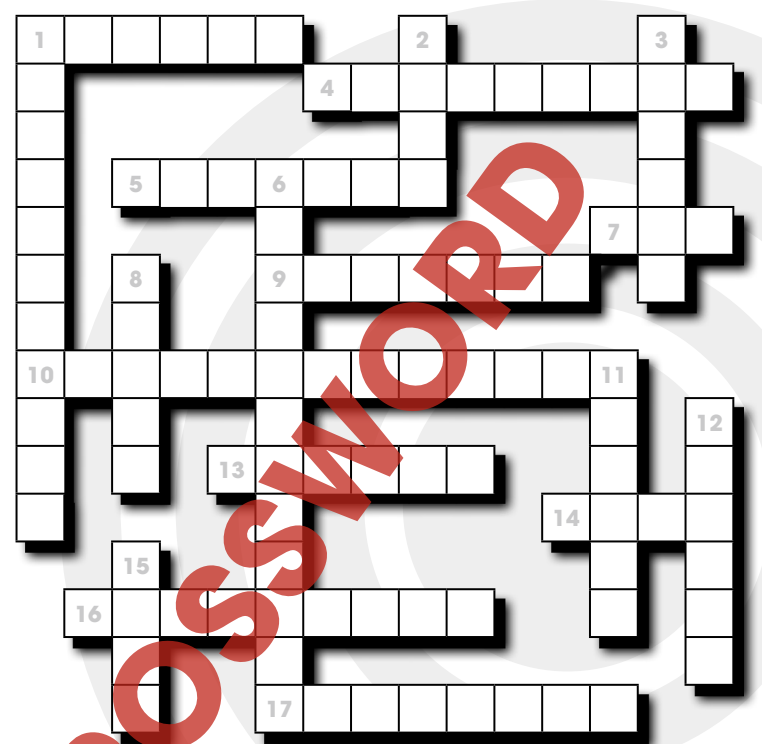
Per Capita Carbon Footprints of States in Tons per Year		
Low Footprint States Use 13 Tons per Year	Medium Footprint States Use 20 Tons per Year	High Footprint States Use 31 Tons per Year
Arizona	Arizona	Alabama
California	Colorado	Alaska
Connecticut	Delaware	Indiana
District of Columbia	Georgia	Iowa
Florida	Hawaii	Kansas
Idaho	Maine	Kentucky
Illinois	Michigan	Louisiana
Maryland	Minnesota	Missouri
Massachusetts	Mississippi	Montana
New Hampshire	Nevada	Nebraska
New Jersey	Pennsylvania	New Mexico
New York	South Carolina	North Dakota
North Carolina	South Dakota	Ohio
Oregon	Tennessee	Oklahoma
Rhode Island	Utah	Texas
Vermont	Virginia	West Virginia
Washington	Wisconsin	Wyoming



Crossword Puzzle!

Across

- Solar power is either passive or _____.
- Martial arts masters get a black belt, and some cities get a _____.
- People sharing rides to work.
- Carbon dioxide is a greenhouse _____.
- The kind of vegetables that are grown without pesticides.
- People who work at home using a computer and telephone.
- This type of fuel releases carbon dioxide when it burns.
- Coal is a fossil _____.
- Per person.
- Someone on his or her way to work.



Down

- The type of fuels that are used to replace fossil fuels.
- Photovoltaic _____.
- _____ climate change.
- The type of device that changes the sun's energy directly into electricity.
- Having to do with the sun.
- A neighborhood outside a city.
- When a city absorbs the sun's energy, it creates a heat _____.
- What greenhouse gases trap.

Word List

- | | | |
|-------------|-----------|---------------|
| active | fuel | organic |
| alternative | gas | per capita |
| carpool | global | photovoltaic |
| cell | greenbelt | solar |
| commuter | heat | suburb |
| fossil | island | telecommuters |



Comprehension Quiz

Part A

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

- Global climate change is caused by a change in the amount of greenhouse gases in the atmosphere.
TRUE **FALSE**
- Carbon dioxide is a greenhouse gas.
TRUE **FALSE**
- Your community carbon footprint is the same as your personal carbon footprint.
TRUE **FALSE**
- Adding parkland to your community increases its carbon footprint.
TRUE **FALSE**
- Some communities generate all their own electricity from renewable sources.
TRUE **FALSE**
- Carbon neutral communities are being built in countries around the world.
TRUE **FALSE**
- People living on low-lying islands are looking forward to a rise in global temperature.
TRUE **FALSE**

Part B

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

- Which invention was the main cause of cities and communities spreading out to cover more land?
 A television
 B cell phone
 C automobile
 D electric light
- Which change in a community's food supply would reduce its carbon footprint?
 A Buying food from farmers closer to home.
 B Improving packaging to keep food fresh longer.
 C Using more chemical fertilizer to increase crop yield.
 D Buying more food than you need to be ready for natural disasters.
- Cities absorb more solar energy than the surrounding countryside, creating a
 A heat island.
 B carbon offset.
 C sea level rise.
 D greenhouse effect.

SUBTOTAL: /10

Carbon Neutral Community



At least nine ways to lower the carbon footprint of a community are shown or hinted at in the picture below. See if you can find them all.

NAME: _____

After You Read 



Climate is Changing, and So Must We

3. Answer the questions in complete sentences.

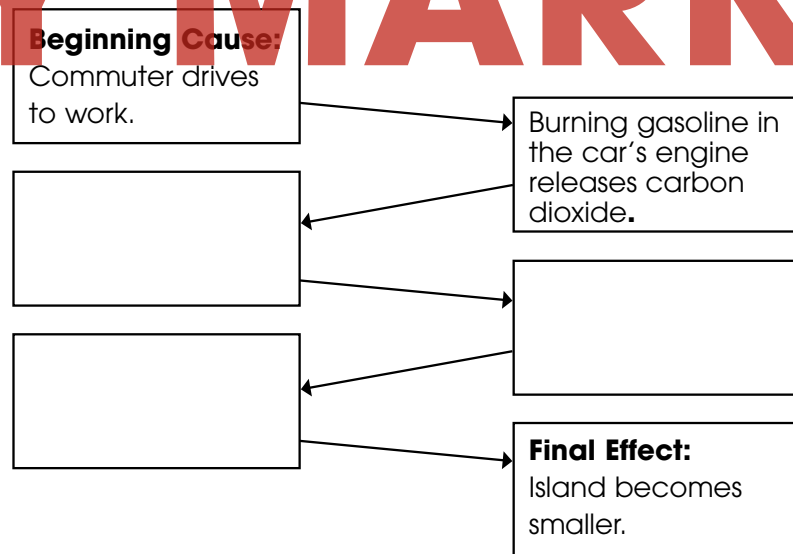
a) Explain how planting trees can help a community become carbon neutral.

b) Describe one method of generating electricity that contributes to global climate change.

c) Describe one method of generating electricity that *does not* contribute to global climate change.

Extensions & Applications

A commuter driving to work in a gasoline-powered car begins a series of cause-and-effect events that lead to a distant island becoming smaller. (Of course, one car is only a small part of the cause of the final result.) Use the graphic organizer to show the complete series of events. Each cause will have an effect, and that effect will then become the cause of the next event. The first step has been done for you.



See page 12 for Final Version Worksheet.

3.

a) (Answers will vary.) Trees remove CO₂ from the air, which helps balance the CO₂ emitted.

b) (Answers will vary.) Using coal as the power source to run electric turbines emits greenhouse gases that cause climate change.

c) (Answers will vary.) Generating electricity with wind turbines does not contribute to greenhouse gases that cause climate change.



Extensions & Applications

(Answers may vary.)

Box 3: Carbon dioxide traps heat, raising global temperature.

Box 4: Higher temperature melts polar ice caps.

Box 5: Melting ice raises ocean level.

EASY MARKING ANSWER KEY