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 **STUDENT HANDOUTS**
READING COMPREHENSION

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•	<i>The Transportation Footprint of a Community</i>	
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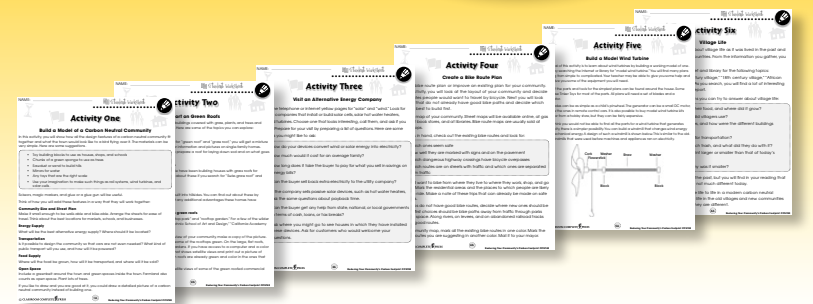
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Reduce, Reuse, Recycle, and Plant

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

a) Which of these is a greenhouse gas?

- A hydrogen
- B methane
- C nitrogen
- D oxygen

b) Which of these items contains a metal that can be recycled?

- A soda cans
- B food scraps
- C newspapers
- D water bottles

c) Why is reducing the amount of a product you use better than recycling the product?

- A Recycling takes too much time.
- B Recycling materials uses energy.
- C Recycled products are not as strong as new ones.
- D Products made from recycled materials do not last very long.

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

a) Old telephone books can be recycled.

TRUE FALSE

b) Food scraps can be composted.

TRUE FALSE

c) All waste materials should be buried in a land fill.

TRUE FALSE

d) Buying new things adds less to the carbon footprint than buying used things.

TRUE FALSE

e) A community can reduce its carbon footprint by planting trees.

TRUE FALSE

f) Plastic drinking water bottles can be recycled.

TRUE FALSE



Reduce, Reuse, Recycle, and Plant

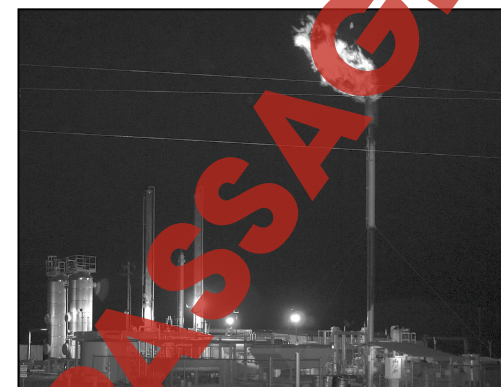
Waste materials are an important part of any town's carbon footprint.

Many communities encourage residents to recycle trash, such as glass, plastic, aluminum, and paper. Some towns make it so easy that the people don't even have to separate the recyclables; they just dump it all in one bin, and it gets separated at a recycling plant.

Recycling is good, but reusing goods is even better. Best of all is reducing the amount of stuff we buy and throw away.

The problem with recycling is that it takes some energy to recycle anything—just not as much as making new materials.

One really good use of trash is to use it to generate electricity. When **microbes decompose** organic waste, such as food scraps, **methane** gas (CH_4) is given off. Methane is a fuel that can be used to power an electric generator. Burning methane does give off CO_2 , but that's an improvement because methane has 20 times as much greenhouse effect as CO_2 . Wood and paper that are sent to landfills can also be used as fuels.



Methane plant located on an old landfill

STOP Explain how energy can be produced from food scraps.

So far we have learned about ways to reduce the amount of carbon dioxide that goes into the air. But can the CO_2 already in the air be removed? It can, but only plants are able to remove useful amounts of the gas. That is one reason towns have tree planting programs. For example, the city of Los Angeles, California plans to spend \$200 million over 20 years to plant one million trees.



Reduce, Reuse, Recycle, and Plant

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

a) What is the chemical formula of the gas produced by decomposing organic matter?

- A CH_4
- B CO_2
- C $NaCl$
- D SO_2

b) Why did Los Angeles plan to plant one million trees?

- A To grow fruit.
- B To shade sidewalks.
- C To produce lumber for new homes.
- D To remove carbon dioxide from the air.

c) Which of these can be used as a fuel?

- A oxygen
- B nitrogen
- C methane
- D carbon dioxide

2. There are several steps in the process of converting food scraps to electrical energy. Number the steps from 1 to 7 in the order they occur.

- ___ a) Collect the methane produced by the microbes.
- ___ b) Cover the food scraps with soil.
- ___ c) Send food scraps to a landfill.
- ___ d) Wait for microbes to decompose the scraps.
- ___ e) Boil water to make steam.
- ___ f) Use the steam to power an electrical generator.
- ___ g) Burn the methane.



Reduce, Reuse, Recycle, and Plant

3. Answer the questions in complete sentences.

a) Explain why buying less of something is better than recycling it when you are done with it.

b) Describe the most efficient way to remove carbon dioxide from the atmosphere.

Extensions & Applications

Describe five things you use at home, part or all of which can be recycled. For each item, explain what it might become after it is recycled.

1. Item: _____

What it can be recycled into: _____

2. Item: _____

What it can be recycled into: _____

3. Item: _____

What it can be recycled into: _____

4. Item: _____

What it can be recycled into: _____

5. Item: _____

What it can be recycled into: _____

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.

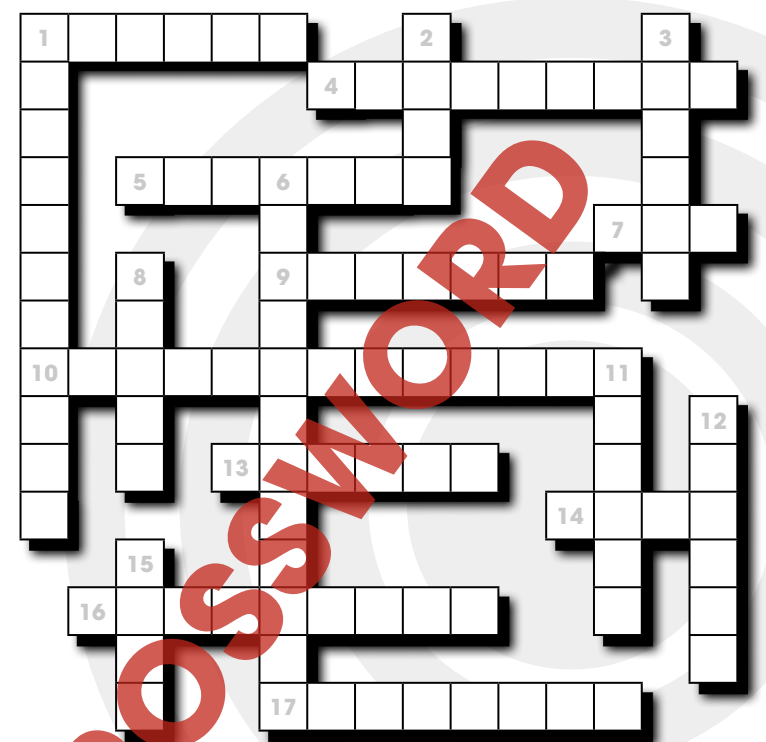
First you will need to find the **per capita** carbon footprint of your state. Per capita means per person. The per capita footprint is the share of the total footprint caused by the activities of the average person and is given in tons per year. Per capita footprints vary widely from state to state. 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!



Reduce, Reuse, Recycle, and Plant

3. Answer the questions in complete sentences.

a) Explain why buying less of something is better than recycling it when you are done with it.

b) Describe the most efficient way to remove carbon dioxide from the atmosphere.

Extensions & Applications

Describe five things you use at home, part or all of which can be recycled. For each item, explain what it might become after it is recycled.

1. Item: _____

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2. Item: _____

What it can be recycled into: _____

3. Item: _____

What it can be recycled into: _____

4. Item: _____

What it can be recycled into: _____

5. Item: _____

What it can be recycled into: _____

3.

Recycling processes usually release some greenhouse gases.

The most efficient way to remove CO₂ from the atmosphere is to plant trees and other green plants.



Extensions & Applications

Answers will vary but may include: glass bottles can be recycled into new glass bottles; newspapers can be recycled into other paper products; aluminum cans can be recycled into new aluminum cans; plastic bottles can be recycled into many plastic products; food scraps can be composted to make organic fertilizer.

10



EASY MARKING ANSWER KEY