



## TEACHER GUIDE

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## EASY MARKING™ ANSWER KEY

22

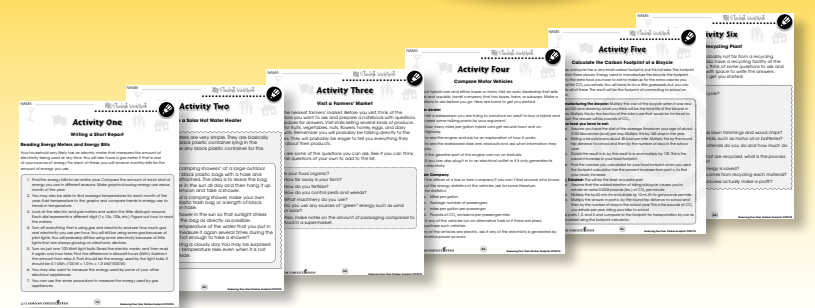
## MINI POSTERS

24

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## A Footprint On Your Dinner Plate

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

- a) Almost all of the food in supermarkets is grown nearby.  
**TRUE**      **FALSE**
- b) Vegetables have no carbon footprint because they are green.  
**TRUE**      **FALSE**
- c) Farmers use chemicals to kill bugs and weeds.  
**TRUE**      **FALSE**
- d) People who eat only organic food are called vegetarians.  
**TRUE**      **FALSE**
- e) Meat has a larger footprint than vegetables.  
**TRUE**      **FALSE**
- f) Food sold at farmers' markets have usually traveled a shorter distance than food sold in supermarkets.  
**TRUE**      **FALSE**

2. Use the words in the list to answer each question.

shipping    fertilizer    packaging    herbicides    seasonal    pesticides

- a) \_\_\_\_\_ What do farmers spread on their fields to make their crops grow better by supplying them with extra minerals and nutrients?
- b) \_\_\_\_\_ What do farmers spread on their fields to kill weeds?
- c) \_\_\_\_\_ What do farmers spread on their fields to kill insects?
- d) \_\_\_\_\_ What adds to the carbon footprint of food just after it leaves the farm?
- e) \_\_\_\_\_ What part of the carbon footprint of food do you avoid when you buy food in bulk by scooping it out of a big bin into a reusable bag?
- f) \_\_\_\_\_ What is the term for fruit that is bought at the same time of year it is locally harvested?



## A Footprint On Your Dinner Plate

**U**nited States agriculture produces about 10% of the national carbon footprint. This means that even the food on your plate has a carbon footprint because growing, fertilizing, harvesting, packaging, and shipping food all release CO<sub>2</sub>, either directly or indirectly.



Agriculture generates 10% of the national carbon footprint.

Farmers drive their tractors many miles back and forth over their fields as they plow the field, sow the seeds, spread **fertilizer**, **pesticide**, and **herbicide**, and harvest the crops. Since the tractors are powered by fossil fuel, this adds to your footprint when you buy the food they grow. There are also many indirect parts of the food footprint. Manufacturing the tractors, machinery, and fertilizer all release CO<sub>2</sub>.

Another indirect part of the food footprint is shipping. On average, food travels 1,500 miles from the farm to your plate. Almost all the trucks, trains, planes, and boats that ship that food add more carbon dioxide to the atmosphere. One way to reduce the shipping part of your food footprint is to buy locally grown produce and locally produced meat and dairy products.

A good place to find local produce is at a farmers' market. There are now over 4,000 farmers' markets in the United States, so the chances are good that you live near one. Some farmers also have roadside stands where they sell what they grow. Remember though, that if you have to drive a long way to buy local produce, you may actually be increasing your footprint. If you can only shop at a supermarket, be



## A Footprint On Your Dinner Plate

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

- a) What percent of the national footprint of the United States is produced by agriculture?  
 A 1%  
 B 10%  
 C 25%  
 D 50%
- b) Farmers use their tractors for all of these tasks, **except**  
 A plowing  
 B fertilizing  
 C harvesting  
 D shipping
- c) What is the average distance that food travels from the farm to the supermarket?  
 A 15 miles  
 B 150 miles  
 C 1,500 miles  
 D 15,000 miles
- d) All of these are ways to reduce your carbon footprint, **except**  
 A buying food that is not packaged  
 B buying food at a roadside produce stand  
 C eating more meat and fewer vegetables  
 D growing food in your own garden

2. Number the events from 1 to 6 in the order they occur in the process of bringing meat from the farm to your table.

- \_\_\_\_\_ a) feeding livestock
- \_\_\_\_\_ b) plowing the field
- \_\_\_\_\_ c) shipping livestock
- \_\_\_\_\_ d) planting grain seeds
- \_\_\_\_\_ e) butchering livestock
- \_\_\_\_\_ f) harvesting grain

## A Footprint On Your Dinner Plate

3. Give two reasons why produce bought at farmers' markets has a lower carbon footprint, on average, than produce bought at a large supermarket.

- a) \_\_\_\_\_
- \_\_\_\_\_
- b) \_\_\_\_\_
- \_\_\_\_\_

### Extensions & Applications

Begin with a grain of seed corn. Describe ten steps needed to turn that seed into a fried egg on your breakfast plate. You may find that there are even more than ten steps, so try to list the ones with the biggest footprints. For each step, describe any addition to your carbon footprint. Use the table below to organize your work. The first and last steps have been done for you.

#### SEED TO FRIED EGG

Describe Step	Describe Addition to Carbon Footprint
Manufacture a tractor	Tractor factory uses energy that came from fossil fuels.
Cook the egg	Stove burns gas that releases CO <sub>2</sub> .



# Calculating Your New, Improved Carbon Footprint

You have read about all the ways you can reduce your carbon footprint, and you have thought about which changes you would like to make, which changes you really will make, and which changes you can talk your family into making. Use estimates of your expected changes to calculate your new footprint.

For some reductions, you will have to decide where you fall in a range. For example, by eating less meat you can reduce your footprint by some amount in the range 0 to 4400 lbs. So if you now eat meat at every meal, and you plan to eat meat one meal a day, you will reduce your footprint by 2/3 of 4400, which is 2933 lbs.

### Changes at home:

Replace inefficient appliances with EPA rated "Energy Star" appliances. Estimate the part of your energy bill used by appliances to be replaced and take 25% of that as your reduction.

Replace tungsten bulbs with fluorescents. Save 1 lb./watt replaced.

Take quick showers instead of long baths. 200 lbs./yr.

Adjust to a wider range of home temperature. For every 4 °F increase in temperature range subtract 250 lbs./yr.

Use a clothesline instead of a dryer. 300 lbs./yr. for an electric dryer and 150 lbs./yr. for a gas dryer.

Improve home insulation. Save 30% of emissions due to heating and air conditioning.

Install double pane windows for a reduction of 3000 lbs/yr, depending on number of windows.

Install a solar hot water heater for 800 lbs./yr. reduction.

Generate your own electricity with photovoltaic cells for a reduction equal to the emissions you calculated for electricity in the first part.

### Total Home Reductions:

Your Personal Reduction (divide by number of people in household)

### Changing Your Diet:

A reduction of 1467 lbs./yr. for each meat meal eliminated every day.

Change from no organic to all organic produce for a reduction of 600 lbs.

Change from all imported to all local food for a reduction of 400 lbs.

Grow your own. The fraction of your food you expect to grow times the total emissions due to food purchases.

### Total Food Reductions:

### Reduction in lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.

\_\_\_\_\_ lbs./yr.



# 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 CO<sub>2</sub>.
- 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.

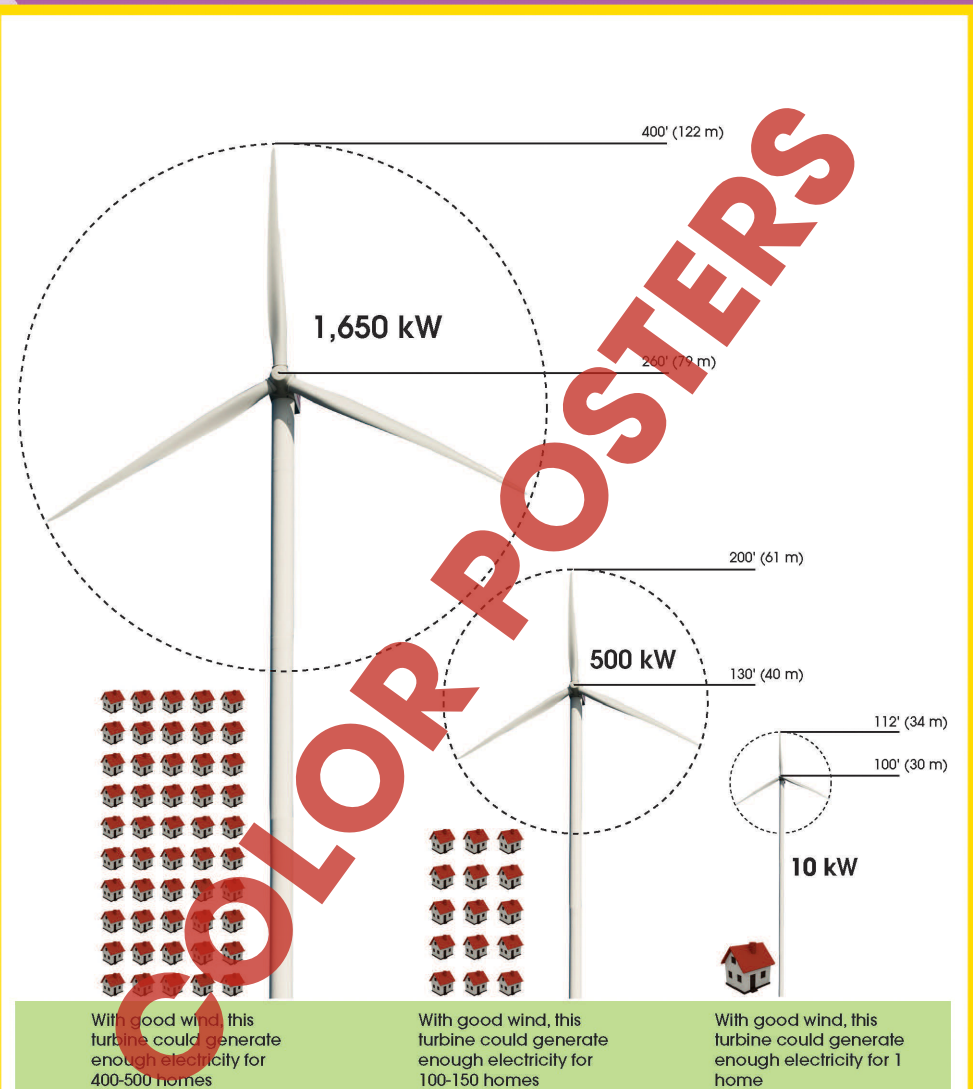
- Human activities are changing Earth's climate.  
**TRUE**      **FALSE**
- Double pane windows will reduce the amount of energy used to heat and cool a home.  
**TRUE**      **FALSE**
- Meat eaters have a smaller carbon footprint than vegetarians.  
**TRUE**      **FALSE**
- Trains produce more CO<sub>2</sub> per passenger-mile than planes.  
**TRUE**      **FALSE**
- Buying new clothing increases your carbon footprint more than buying second-hand clothing.  
**TRUE**      **FALSE**
- Photosynthesis removes CO<sub>2</sub> 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 CO<sub>2</sub> 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

# Wind Turbine Capacity



NAME: \_\_\_\_\_

After You Read 



# A Footprint On Your Dinner Plate

3. Give two reasons why produce bought at farmers' markets has a lower carbon footprint, on average, than produce bought at a large supermarket.

- a) \_\_\_\_\_  
 \_\_\_\_\_
- b) \_\_\_\_\_  
 \_\_\_\_\_

## Extensions & Applications

Begin with a grain of seed corn. Describe ten steps needed to turn that seed into a fried egg on your breakfast plate. You may find that there are even more than ten steps, so try to list the ones with the biggest footprints. For each step, describe any addition to your carbon footprint. Use the table below to organize your work. The first and last steps have been done for you.

### SEED TO FRIED EGG

Describe Step	Describe Addition to Carbon Footprint
Manufacture a tractor	Tractor factory uses energy that came from fossil fuels.
Cook the egg	Stove burns gas that releases CO <sub>2</sub> .

3.

(Answers will vary.)  
 Farmers' market produce is more likely to be (any two) locally grown, organic, not packaged, in season.

### Extensions & Applications

#### SEED TO FRIED EGG

##### Describe Step

- Manufacture a tractor
- Plant a field
- Sow seeds
- Harvest corn
- Ship corn to mill
- Grind corn into chicken feed
- Ship feed to chicken farm
- Feed chickens, collect and pack eggs
- Ship eggs to market
- Cook the egg

##### Describe Addition to Carbon Footprint

- Tractor factory uses energy that came from fossil fuels.
- Fossil fuel to run tractor.
- Fossil fuel to run tractor.
- Fossil fuel to run tractor.
- Fossil fuel to run truck.
- Energy to run mill.
- Fossil fuel to run truck.
- Energy to run feeding, collecting, packing machines.
- Fossil fuel to run truck.
- Stove burns gas that releases CO<sub>2</sub>.

##### 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



**EASY MARKING ANSWER KEY**

