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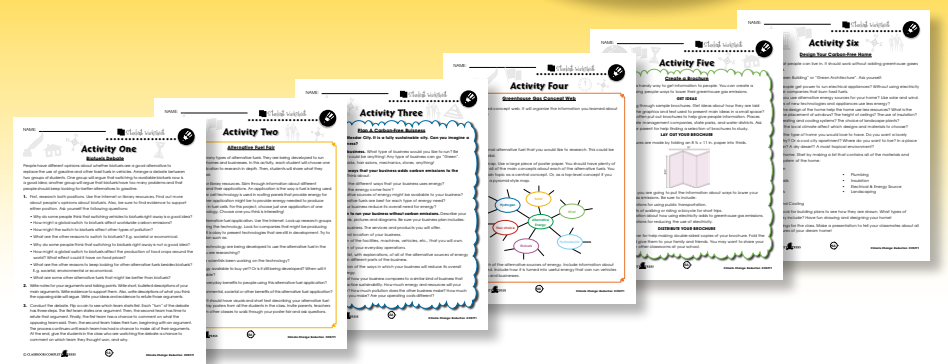
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Transportation

1. How do you get to school every day? What kinds of public transportation are there in your area? Do you ever use them? Explain.

2. Write each word beside its meaning.

efficiency	commuter	individual	vehicle
release	technology	energy	

- a) A person who travels from home to work.
- b) To let go.
- c) The amount of energy that is changed into useful work by a machine.
- d) The practical application of knowledge.
- e) A car, bus, or truck.
- f) A single person or item.
- g) The ability to do work or cause change.



Transportation

Transportation is the movement of people and goods. It is one of the biggest sources of greenhouse gas emissions. Many vehicles are now being made with technology that gives them greater **fuel efficiency**. A car that uses less fuel to go somewhere is more efficient. **Hybrid** technology is an example. It uses electricity stored in batteries as power. It also uses an "idle-off" feature. This turns off the engine when the car is stopped. "Regenerative braking" is another feature. It stores some of the energy from braking in the batteries. This saved energy can be used later.



Bike sharing program



What is a hybrid vehicle?

Public transportation can help lower greenhouse gas emissions. Trains and buses can move more people using less fuel. Many cities use **commuter** trains that run on electricity. This results in less air pollution. Another alternative to cars is walking or riding bicycles for short trips. There are also bike sharing programs available in many cities. Docking stations can be found in many places around the city. This allows someone the freedom to move around without having to buy or store their own vehicle.

The transportation of goods also results in a lot of greenhouse gas emissions. One way to cut down on this is for people to buy products made close to home. A farmer's market will have food items grown nearby. Look at the packaging on items at the store. Pick things that were packaged close to your area. When shopping online, consider picking up the items at the warehouse. Or have them ship to your local store. This will also save on shipping costs.



Transportation

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

- a) Transportation is one of the biggest sources of greenhouse gases.
TRUE **FALSE**
- b) Hybrid cars use energy from the sun to drive.
TRUE **FALSE**
- c) A car with greater fuel efficiency will travel farther on a gallon of gas than a car with lower fuel efficiency.
TRUE **FALSE**
- d) Hybrid vehicles have low fuel efficiency.
TRUE **FALSE**
- e) Buying products made or grown closer to home can help lower greenhouse gas emissions.
TRUE **FALSE**
- f) Using public transportation can lead to higher greenhouse gas emissions.
TRUE **FALSE**

2. List five modes of transportation that could help lower greenhouse gas emissions.



Transportation



3. Answer each question with a complete sentence.

- a) Buying things made closer to home helps lower greenhouse gas emissions. How?

- b) Why do hybrid cars have a high fuel efficiency?

Research

4. Learn more about hybrid technology.

Work in a small group. Create a model of a hybrid vehicle. First, use the Internet or library resources. Research more about how a hybrid vehicle works. Find out the answers to the following questions:

- When were hybrid vehicles first invented?
- What are the main components of a hybrid driving system? How does it differ from a gas-burning engine?
- What is "idle-off"? How does it work?
- What is "regenerative braking"? How does it work?
- What kinds of batteries are used in hybrid vehicles? How has battery technology changed?
- What are ultracapacitors? How are they different from batteries? What are the advantages of using them in hybrid vehicles?

In your model, show the main parts of the driving system. Remember to show how they interact together. Include labels and captions describing all the main parts. Prepare a presentation. You should talk about the following: How each part works. The history of the technology. Areas for future technological development.

Plan a Green City

You learned about Masdar City. It is one of the only fully-sustainable urban communities. Now, plan a city in your area that will do the same.

First, think about what you would like your city to contain. Ask yourself the following questions:

- What kinds of structures will people live in?
- Where will people go to school and work?
- How will people buy the things they need every day? Like food and clothing.
- How will people get around in the city?
- Where will people go to have fun?

Then, think about the needs of a city in the type of environment where you live. Ask yourself the following questions:

- What is the weather like? Will people need heat? Will they need cooling? Will they need protection from storms?
- What alternative energy resources are available? Does your region get enough sunlight to use solar power? How about wind energy? Is there a source for hydroelectric power?
- How can your city lower its need for power so that alternative sources of energy will be enough? People will need less fuel and electricity. What are some urban planning choices you could make?

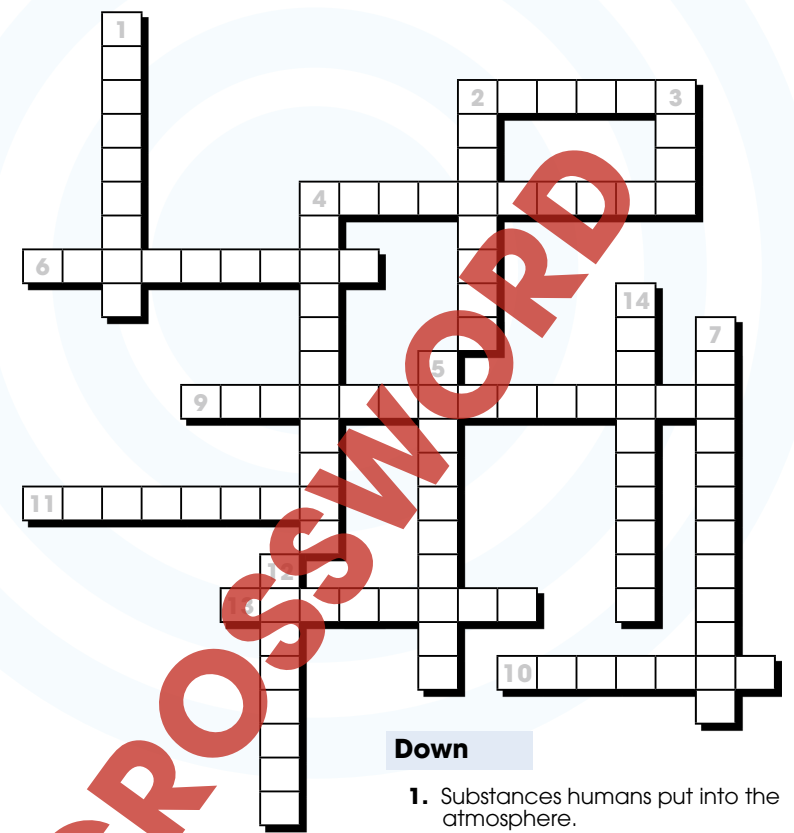
Now, build a model of your city. Start by creating a map. Mark the locations of buildings, walkways, public transportation, parks, and any other features you are including in your city. Then, create a three dimensional model based on your map. You may wish to visit your local planning department. See how urban planners build models. Use any kinds of materials, like cardboard, clay, wire, balsa wood, sand, aluminum foil, and miniature figurines. Paint the model where appropriate.

Finally, display your model in the classroom. Talk about the features of your city that will lower or eliminate greenhouse gas emissions and waste. Talk about the daily life of people living and working in your city. Invite your classmates to ask questions.

Crossword Puzzle!

WORD LIST

- biofuel
- dams
- efficiency
- emissions
- fuel cell
- hybrid
- hydrogen
- manufactured
- planning
- pollutants
- renewable
- solar cells
- solar energy
- transportation
- turbines



Across

2. A car that uses electricity as power.
4. Objects that change energy from sunlight into electricity (two words).
6. Most alternative fuels are also _____.
9. The movement of people or goods from one place to another.
10. An alternative fuel made of vegetable oil or plant parts.
11. Urban _____.
13. Wind _____ change energy from wind into electricity.

Down

1. Substances humans put into the atmosphere.
2. A common gas in the atmosphere used for energy in fuel cells.
3. Structures that block the flow of rivers.
4. Energy from the Sun (two words).
5. A substance or condition that contaminates air, water or soil.
7. Products that are made by people are _____.
12. Technology that uses hydrogen as a source of energy to power vehicles.
14. Fuel _____ describes how far a car can go on a certain amount of fuel.

Comprehension Quiz

Part A

30

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

1. Most greenhouse gas emissions come from burning fossil fuels.
TRUE FALSE
2. If people stop emitting greenhouse gases today, Earth's average temperature will start to go down right away.
TRUE FALSE
3. Alternative fuels release more greenhouse gases than fossil fuels.
TRUE FALSE
4. Renewable sources of energy are replaced by nature faster than they are used up.
TRUE FALSE
5. Hydroelectric generators change energy from sunlight into electricity.
TRUE FALSE
6. A product made with recycled materials most likely used less energy to make than the same product made with raw materials.
TRUE FALSE
7. Products that are manufactured are made by people using raw materials.
TRUE FALSE
8. Buying fruits and vegetables grown near where you live is one way to help lower greenhouse gas emissions.
TRUE FALSE

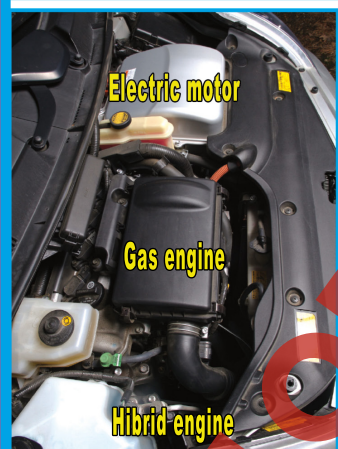
Part B

5

List five transportation choices that result in less greenhouse gas emissions than driving individual vehicles.

SUBTOTAL: /13

Alternative Energy Automobiles





Transportation



3. Answer each question with a complete sentence.

a) Buying things made closer to home helps lower greenhouse gas emissions. How?

b) Why do hybrid cars have a high fuel efficiency?

Research

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1.

a) TRUE

b) FALSE

c) TRUE

d) FALSE

e) TRUE

f) FALSE

2.

Answers will vary.

9

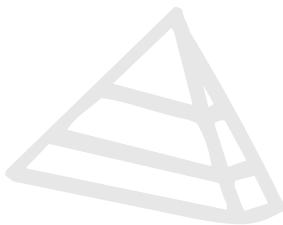
3.

a) Less fuel is needed for shipping.

b) Hybrid technology uses electricity stored in batteries as power. It has a feature that turns off the engine when stopped. It stores some energy from braking to be used later.

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EASY MARKING ANSWER KEY



Transportation



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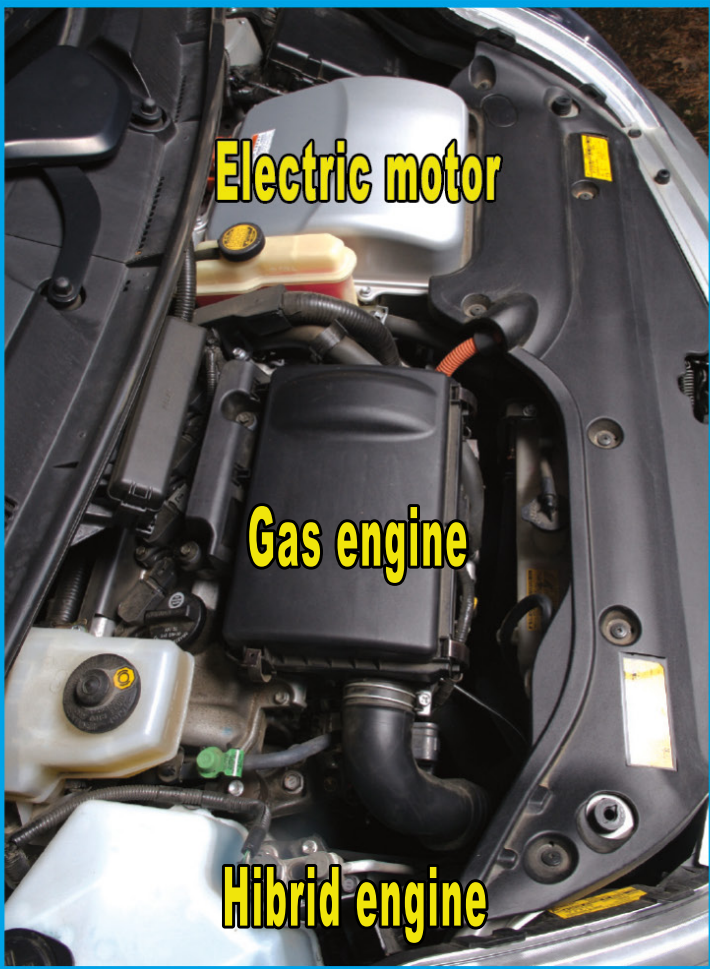
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Alternative Energy Automobiles



Toyota Prius hybrid car



Electric motor

Gas engine

Hibrid engine



Electric Taxi



Hydrogen fuel connector



Electrical charging station



Electrical charging connector



BMW hydrogen car