Name_____ Date _____

Fleet Manager

Lesson 2: Carbon Dioxide Problems

One of the major problems with engines that are found in most current vehicles is the amount of carbon dioxide the engine releases after the fuel is burned. Can you convert a vehicle's engine type to reduce the carbon dioxide emissions?

Doing the Science

1. Start the Fleet Manager Simulation.

2. Select one of the vehicles in the fleet.

3. Select the "Use" USE button, then the "Drive" DRIVE button. When the vehicle completes the route, select the "Status" STATUS button.

4. Record in Table 1 below the Vehicle name, Engine Type, Vehicle Color, and CO_2 Emissions released annually by the vehicle.

Table 1. Carbon Dioxide Emissions

Vehicle	Engine Type	Vehicle Color	CO_2 Emissions (tons/year)

5. Close the box by selecting the "X" in the upper right-hand corner, and then select the "Fleet" FLEET button.

6. Select a different vehicle and repeat steps 3-5. Test a total of three different vehicles. Make sure to record your data in Table 1 above.

7.   Select one of the same vehicles you previously tested (use the vehicle's color if you can't remember the names of the vehicles) and select the "Convert" CONVERT button at the bottom of the screen.

8.   Select one of the eight engine conversions. Make sure to record the engine conversion type in Table 2 below. Select the "Make Conversion" MAKE CONVERSION button.

Table 2. Converted Vehicle Carbon Dioxide Emissions

Vehicle	Vehicle Color	Conversion Type	CO_2 Emissions (tons/year)

9.   Repeat steps 3 – 5 to test drive your converted vehicle.

10.   Repeat steps 7 – 9 for a total of three converted vehicles.

What Do You Understand?

1.   When oil is removed from the ground to make gasoline, is this mainly an example of depletion or degradation of a natural resource? Provide a reason to support your answer.

_____

_____

_____

2. The main chemical reaction when gasoline is used to provide energy to move a vehicle is given by the following:

Gasoline and oxygen forms carbon dioxide and water and heat

Where does the oxygen come from that reacts with the gasoline?

_____

_____

_____

3. One gallon of gasoline can ruin 1,000,000 gallons of fresh drinking water. Is this an example of depletion or of degradation of the drinking water?

_____

_____

_____

4. Gasoline stations are required to have a special collection system for gasoline that spills on the ground during vehicle fill ups. What is the purpose of this special collection system?

_____

_____

_____

5. Which vehicle that you tested released the most carbon dioxide into the air on a yearly basis?

_____

_____

_____

6. Calculate the percentage the carbon dioxide emission was *reduced* for each conversion. To find this value use the following formula:

[(gasoline CO_2 emission - converted engine CO_2 emission)/converted engine CO_2 emission] x 100%

_____

_____

_____

7. Which engine conversion was most effective at reducing the amount of carbon dioxide released by the vehicle? Provide a reason for the improved air quality rating of this vehicle's engine.

_____

_____

_____

8. State a possible problem that might arise with the engine conversion you described in question #7.

    _____

    _____

    _____

9. Carbon dioxide is a greenhouse gas that has been shown to affect climate change on Earth. Describe how the engine conversion you described in question #7 might help reduce the effects of climate change.

    _____

    _____

    _____