

**LESSON PLAN**  
~Grade 5 Mathematics~

**“How Much Did You Idle Your Vehicle Today?”**  
~ A Broken-Line Graph ~

-created by Lynn Perreault, Ph.D. (for Idle-Free Windsor)

<b>Date:</b>	<b>Time:</b>
<b>School:</b>	<b>Teacher:</b>
<b>Special Instructions:</b>	

**Ontario Curriculum Connection**

By the end of Grade 5, students will:

**Overall Expectation (Data Management and Probability):**

- Collect and organize discrete or continuous primary data and secondary data and display the data using charts and graphs, including broken-line graphs.

**Specific Expectations (Collection and Organization of Data):**

- Collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or the community, or content from another subject, and record observations or measurements;
- Collect and organize discrete or continuous primary and secondary data and display the data in charts, tables, and graphs that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools.

**MATERIALS & EQUIPMENT:**

Data Cards (Appendix 1), and Student Worksheets (Appendix 2).

**Vocabulary:**

**Words & concepts your class may be learning**

**Idle or Idling:** Inactive, not in use, not moving or in operation (e.g., an idling vehicle is one that has the engine running while parked).

**Vehicle:** A machine or object that helps us get from one place to another (e.g., car, minivan, or pick-up truck).

**CO<sub>2</sub>:** Carbon dioxide (a greenhouse gas that is emitted from a running vehicle engine).

**Emission or emitted:** The process of sending out.

## PROCEDURE

### Part 1 (Vocabulary)

**Topic Intro - Brainstorming, Connecting ideas** (assess students' knowledge!) ~5 min.

Ask students:

What does "idle" or "idling" mean? How do you use it in a sentence?

What does "vehicle" mean? Can you name different types of vehicles?

What does "CO<sub>2</sub>" mean? How do you use it in a sentence?

What does "emission" mean? How do you use it in a sentence?

### Part 2 (Setup)

**Activity** ~ 5 min.

Ask for six student volunteers. Distribute one data card per student volunteer (see Appendix 1). Explain to the class that each card contains information that will be put into a table, and then drawn up as a broken-line graph. (Please note that the data cards represent reality. For example, 1 litre of gasoline actually releases 2.4kg of CO<sub>2</sub> into the atmosphere).

### Part 3 (Collecting Data)

**Activity** ~ 10 min.

After the six students have a card in hand, ask each one to read their card out loud, one at a time. Put each bit of information into Table 1. For example, when the card "1 litre of gasoline = 2.4 kg of CO<sub>2</sub>" is read, include the "1" under the first column (i.e., "Litres of gasoline used while idling (L)") and include the "2.4" under the second column (i.e., "Amount of CO<sub>2</sub> released into the atmosphere (kg)"). Students will also fill out Table 1 on their worksheet (see Appendix 2). For example:

**Table 1:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline

<i>Litres of gasoline used while idling (L)</i>	<i>Amount of CO<sub>2</sub> released into the atmosphere (kg)</i>
1	2.4
3	7.2
2	4.8
4	9.6
6	14.4
5	12

### Part 4a (Organizing Data - Table)

**Activity** ~ 15 min.

Using Table 2 on their worksheet (see Appendix 2), ask students to organize the data by number size (e.g., smallest numbers in the first row, up to the largest numbers in the last row). For example:

**Table 2:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline

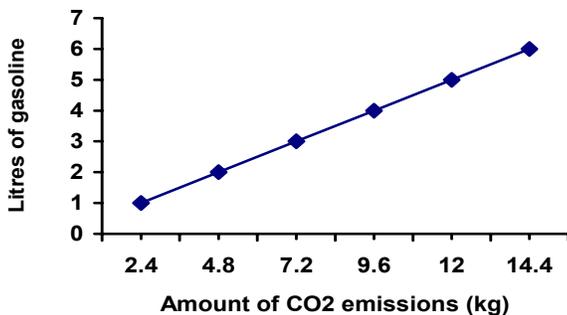
<i>Litres of gasoline used while idling (L)</i>	<i>Amount of CO<sub>2</sub> released into the atmosphere (kg)</i>
1	2.4
2	4.8
3	7.2
4	9.6
5	12
6	14.4

### Part 4b (Organizing Data - Graph)

**Activity** ~ 35 min.

Using Graph 1 on their worksheet (see Appendix 2), ask students to create a broken-line graph based on the data displayed in Table 2. Students will also list the appropriate unit numbers on both the x-axis and y-axis (please note that the numbers displayed on the y-axis are misplaced due to word processor limitations). For example:

**Graph 1:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline



For more information about Windsor's anti-idling campaign, please visit [www.idlefreewindsor.org](http://www.idlefreewindsor.org) or call 519-973-1156. (After May 1, 2007, please call the Citizens Environment Alliance at 519-973-1116.)

Appendix 1

DATA CARDS

**1 litre of gasoline =  
2.4 kg of CO<sub>2</sub>**

**2 litres of gasoline =  
4.8 kg of CO<sub>2</sub>**

**3 litres of gasoline =  
7.2 kg of CO<sub>2</sub>**

**4 litres of gasoline =  
9.6 kg of CO<sub>2</sub>**

**5 litres of gasoline =  
12 kg of CO<sub>2</sub>**

**6 litres of gasoline =  
14.4 kg of CO<sub>2</sub>**

## Appendix 2

### Student Worksheet

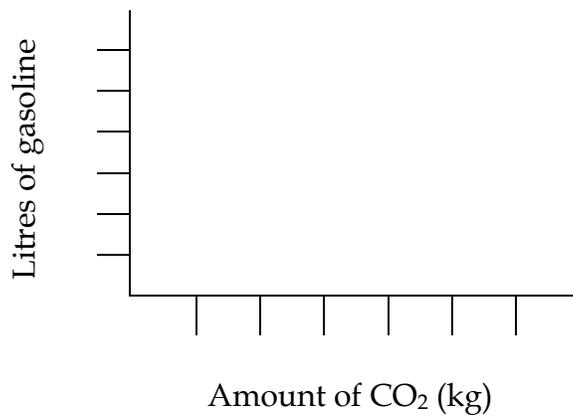
**Table 1:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline

<i>Litres of gasoline used while idling (L)</i>	<i>Amount of CO<sub>2</sub> released into the atmosphere (kg)</i>

**Table 2:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline

<i>Litres of gasoline used while idling (L)</i>	<i>Amount of CO<sub>2</sub> released into the atmosphere (kg)</i>

**Graph 1:** Amount of CO<sub>2</sub> released into the atmosphere per litre of gasoline



## ASSESSMENT TOOL

### How Much Did You Idle Your Vehicle Today?

Teacher Name: \_\_\_\_\_

Student Name: \_\_\_\_\_

CATEGORY	4	3	2	1
Understanding of concepts	Demonstrates a thorough understanding of tables and graphs.	Demonstrates a general understanding of tables and graphs.	Demonstrates some understanding of tables and graphs.	Demonstrates a limited understanding of tables and graphs.
Requirements	All of the assigned requirements were met. (e.g., including filling out Tables 1 & 2; listing unit #s on the x- and y-axes of the graph; drawing a broken line on the graph).	Almost all of the requirements were met.	Most of the requirements were met, but several were not.	Many requirements were not met.
Application of procedures	Used procedures that included few, if any, minor errors or omissions in completing the table and graph.	Used procedures that included few errors and/or omissions in completing the table and graph.	Used procedures that included some errors and/or omissions in completing the table and graph.	Used procedures that included many errors and/or omissions in completing the table and graph.