

## Teaching notes.

These materials are to be used in the Science lessons. Pupils are working one science unit per term with the language teacher and the other/s with their subject teacher. The timing is arranged in a way that when the subject teacher finishes his/her units the language teacher substitutes he/she in the timetable. So students never have two science units at a time.

Students will get the worksheets day by day and they will make a dossier that is going to be presented independently from the subject. The English teacher is going to check it and pass the mark to the subject teacher.

Pupils are already familiar with this type of work because they have already worked with this system in previous years.

They know that working content in English is a step forward, not only in terms of language but also in learning abilities. They see it as a challenge.

## Lesson 1

### Activity 1

Teacher distributes pupils in three groups. He explains that he will give them a text to read and understand. He also will suggest helping each other to understand it before asking the teacher, so they can work together within the group. He explains that all students of the same group will have a copy of the same text, but every group will get a different text. Then he/she will pass the texts round the groups.

Teacher will go around the class to check if they can understand on their own and helping when he/she considers it necessary.

**Air & Atmosphere**

The Earth's atmosphere is a layer of gases surrounding the planet Earth and retained by the Earth's gravity. It contains oxygen, nitrogen, argon, carbon dioxide, water, and a small amount of ozone.

The average of air is normal human at 0°C.

Argon  
Carbon Dioxide  
all others  
Oxygen 21%  
Nitrogen 78%

The atmosphere gets its life on Earth by absorbing ultraviolet solar radiation and reducing temperature extremes between day and night.

**Layers**

Troposphere  
Stratosphere  
Mesosphere  
Thermosphere

**Air properties**

Air occupies space. The space air occupies can be reduced, it can be compressed. The volume of air can be increased, it can be expanded.

Air hasn't got a smell, but it covers the smell of things. We smell things with our nose. We have the factory smell in our rooms.

Air hasn't got taste.

Air hasn't got colour.

Air has weight, even though it is very light. Furthermore hot air is lighter than cold air. Look at the balance scale and see what happens.

**Air inventions**

Ballooning started in 1783. Montgolfier always wanted to achieve one challenge and the conquest of air was one of the most challenging.

Scientists already knew that hot air weighed less than cold air, so hot air is lighter than cold air. Consequently an airbag that could heat air was prepared and also a bag container to hold the hot air.


The machine must be light. They used things that don't weigh much like fabrics, ropes and wicker to make the basket.

A robed monk, a sheep and a rooster were lifted in a paper and fabric balloon and few months later a French scientist, Mariade Koeper, also flew.



## Activity 4

Roles play the characters pretending they are in a TV or radio interview

<b>CHARACTER: PILATRE DE ROZIER</b> 
<ul style="list-style-type: none"><li>➤ Serious, calm and polite.</li><li>➤ I want to fly because I like landscape views.</li><li>➤ I don't know because I am not a weather expert.</li><li>➤ I used animals because I didn't know if the balloon would float.</li><li>➤ Sorry, I don't understand the question. Can you repeat, please?</li></ul>
<b>WEATHER FORECASTERS:</b>
<ul style="list-style-type: none"><li>➤ Patient, polite and educated.</li><li>➤ Because hot air is lighter than cold air.</li><li>➤ I mean that hot air weighs less than cold air, so hot air moves up.</li><li>➤ Currently we are using more resistant fabrics.</li><li>➤ Pardon, can you say it again?</li></ul>
<b>INTERVIEWER:</b>
<ul style="list-style-type: none"><li>➤ Forgetful, beginner and confused.</li><li>➤ Why do you want to fly?</li><li>➤ Why does the balloon fly?</li><li>➤ Sorry, I don't get you. What do you exactly mean?</li><li>➤ Why did you put animals on the balloon?</li><li>➤ Do you think this could happen now?</li></ul>

## Lesson 2

### Activity 1

#### Experiments

The teacher asks pupils to make groups of four. He/she explains that they are going to carry out some experiments and they have to arrange the class as a laboratory. So they have to move the tables, six tables will be distributed in the class leaving enough space among them to move around and the rest will be placed next to the walls.

The teacher asks groups to situate themselves around one table each group. Then he/she distributes the roles (scientist, helper, secretary, reader)\* and gives the materials needed to carry out the experiment.

Scientist: carries out the experiment.

Helper: helps the scientist

Secretary: writes the results in the worksheet.

Reader: reads how to proceed, the question and the possible answers.

After each experiment pupils swap the roles.

\*The teacher can prepare some labels with the roles or any other distinctive.

**Experiment 1**

Procedure: Blow up a balloon  
blow into 1 balloon three times.  
Blow into another balloon five times.

What is different about the volume of the balloon?

A) The more I blow into a balloon the bigger it gets, because air expands to fill a space.  
B) The balloon gets bigger because the air from my mouth is hot.  
C) The volume of the balloon is the same.  
D) All answers are correct.

Choose the answer and write it in your answer worksheet

**Experiment 2**

Procedure: Does air have weight?  
Pick up a balloon and weigh it.  
Pump air into the balloon three times.  
Weigh the balloon again.

Has the weight increased or decreased?

A) The weight has decreased because the air in the balloon makes it lighter.  
B) The weight has increased because the air in the balloon also has weight.  
C) The weight is the same.

Choose the answer and write it in your answer worksheet

**Experiment 3**

Procedure: Is hot air lighter than cold air?  
Cut three thin strips of paper.  
Hold the strips by one edge.  
Place the strips 10cm above the heater.  
Turn on the heater.

Why are the strips moving?

A) As hot air is lighter it moves up and makes the strips move up.  
B) The strips move because wind is produced by the heat.  
C) All answers are correct.

Choose the answer and write it in your answer worksheet

**Experiment 4**

Procedure: Blow up a balloon in a bottle.  
Check the balloon and the bottle.  
Put the balloon inside the bottle.  
Pull the neck of the balloon over the neck of the bottle.  
Blow up the balloon.

Why can't you blow up the balloon?

A) Because the balloon hole is too big.  
B) Because air inside the bottle takes up the space and this air cannot escape.  
C) Because they have different volumes and also a different colour.

Choose the answer and write it in your answer worksheet

**Experiment 5**

Procedure: Extract the air from a container.  
Hold the tube with your hand.  
Place it on your lips. Suck the air through the tube.  
Put your thumb over the end of the tube.

What has happened with the water?

A) The water goes up because we create an empty space by sucking the air out.  
B) The water goes down because there is less air; we have contracted it.  
C) The water doesn't move.

Choose the answer and write it in your answer worksheet

**Experiment 6**

Procedure: Stop a water bottle with a hole from emptying.  
Fill the water bottle.  
Lift the bottle above the container—see if the water flows out into the container.  
Now put your finger over the hole in the bottle top.  
Does the water still flow out?  
Cover and uncover the hole in the bottle top and see what happens.

Why does the water stop pouring?

A) Because your finger is a magic finger and it's got the power to stop water.  
B) Water continues pouring from the bottle.  
C) As no air can get into the bottle no water can get out because the volume is the same.

Choose the answer and write it in your answer worksheet

## Activity 2

The teacher can use the power point presentation to correct the answers or ask different pupils to come next to the computer and click him/herself.

EXPERIMENTS							
Experiment 1	Blow up a balloon						
What is different about the volume of the balloon?	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 2px;">Letter:</td> <td style="padding: 2px;">Write the answer</td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> </table>	Letter:	Write the answer				
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Experiment 3	Fast or slower than water?						
Why are the strips moving?	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 2px;">Letter:</td> <td style="padding: 2px;">Write the answer</td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> </table>	Letter:	Write the answer				
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## Activity 3

Explain an experiment

The teacher asks for a volunteer to come in front of the class to explain how he proceeded while he/she was carrying out the experiment. The teacher helps and encourages the pupil as he/she explain it. After two or three volunteers teacher can ask students to do it in small groups and there will be more opportunities to speak.



### Lesson 3

#### Activity 1

Some Pupils read aloud the first part of the text. Make sure they understand the meaning of layer. Use the pictures to make questions about the objects that appear in different layers (use close questions because they will find out why in activity 5). You can ask pupils to write the name of new objects next to each picture as you mention them.

#### Activity 2

The teacher guides students' attention on the Earth picture and reads the texts him/herself, making emphasis on the layer in which it happens and the side effects it can cause. Then he/she asks the question and checks the previous knowledge pupils have on the issue.

#### Activity 3

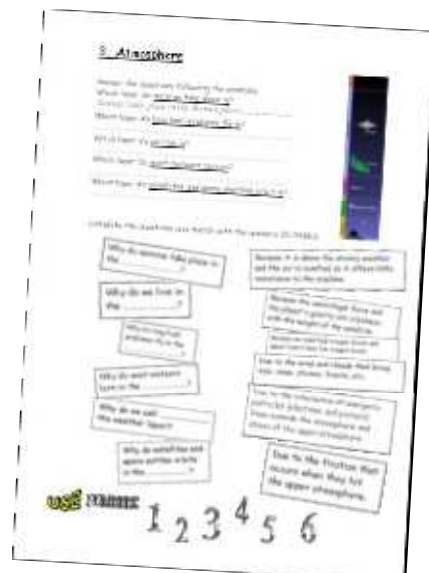
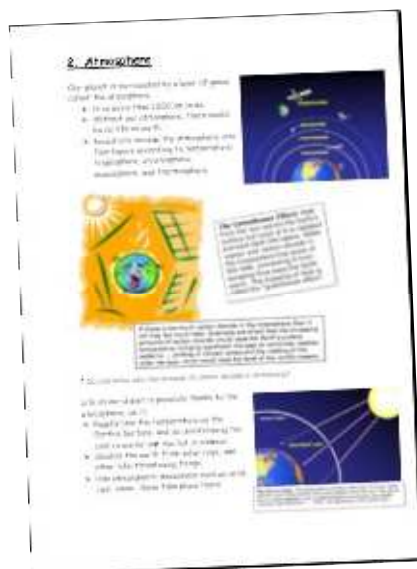
Some pupils read aloud the second part of the text. Make sure pupils understand what is to 'shields the Earth'. After, the teacher reads him/herself under the picture and focus students' attention on the layer in which it happens.

#### Activity 4

The teacher explains that the underlined part of every question can help them to begin the answer as it's shown in the example. Then pupils answer the questions on their own.

#### Activity 5

The teacher advises pupils to begin completing the question looking at the Atmosphere layer pictures and afterwards matching them with their answers.



## Lesson 4

### Activity 1

The teacher show a power point presentation and explains slides one to seven to give a general view of wind. Then he/she explains that they will see some images where wind effect is noticed and students will have to classify them into breeze, gale or hurricane and why.

It is a breeze because it is a soft wind

It is a gale because it is a strong wind

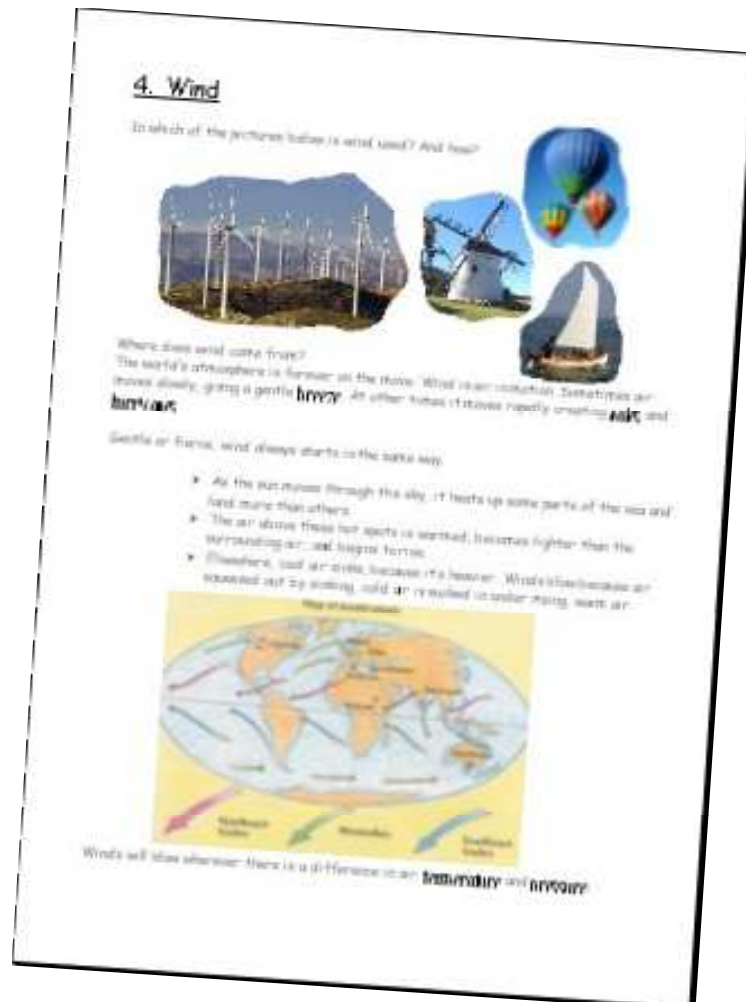
It is a hurricane because it is a very strong wind

### Activity 2

Teacher asks different students in which pictures wind is used. Then he/she goes on asking how it is used (slide 7 can be shown again). Teacher helps and encourages students to explain how wind is used.

### Activity 3

Some pupils read aloud the text and teacher mimes different kinds of wind and asks some students to mime it as well. He/she also mimes the wind production.



### Activity 4

Pupils answer the questions, slides two; three and seven can be shown while students are answering.

### Activity 5

Pupils match the word, the picture and the explanation. After, teacher can go back to the ppt and ask students to do the same they did in activity 1 but this time they can give a more detailed explanation of why it is a breeze, gale or hurricane using the explanations or the answer they used the first time. Teacher also can use slide four to give a more precise explanation.

### Activity 6

Pupils write true or false next to each sentence alone. After, the teacher shows the ppt to correct the activity. Wrong sentences can be corrected underneath.

**5. Wind**

What is wind?  
Explain how wind is produced.  
Say three things that use wind.  
Do you know if we use wind turbines to produce electricity in Catalonia? Where?  
Match the word, the picture and the explanation.

**Hurricane**   It causes the branches of the trees violently.

**Breeze**   It causes the leaves of the trees gently.

**Gale**   It can pull out trees and roofs from houses.

Write true (T) or false (F)

Air moves because of differences in temperature and pressure around the world.  
The Scale to measure the wind force is called the wind rose.  
Sea breeze happens during the night and land breeze happens during the day.  
The Coriolis Effect affects the direction of the wind.  
Windmills were once used to grind wheat to make flour.  
A gale is necessary to fly a kite.  
Hurricanes blowing on wind turbines are good for electricity generation.  
Sailing ships were thanks to the force of the wind.



## Lesson 5

### Activity 1

The teacher explains that they will see a power point presentation about air and atmosphere. He/she also gives a worksheet with questions related to the presentation.

The teacher begins showing the ppt and goes on asking questions about the images. Some will be about the slide itself asking if they can identify what is shown or if they can say the name of what appears in the screen, other questions will be related to the way of breathing and the worksheet questions, which they will have to answer.

The teacher will tell the students that they can use the underlined part to begin the answer in some questions.

As it is a long activity some extra crickets were introduced in slide eight to pause a little before going on with the questions. There is another pause in slide sixteen.

The last five slides have questions to be answered and to complete the sentences in the worksheet.



## **Lesson 6**

### **Activity 1**

The teacher asks pupils to do the activity on their own. They have to circle the air polluting elements or pictures they have in their worksheet. Then he/she corrects the activity with all the class. He/she asks one pupil to say one of the circled pictures. The teacher helps with the names of the elements and makes students copy the names under each picture. Then he/she asks the pupil how that element pollutes the air and encourages and helps him/her to answer.

### **Activity 2**

Some pupils read aloud and the rest of the class follow the reading in silence. The teacher focuses student attention on the capital letters and the bold letters as well.

### **Activity 3**

The teacher asks pupils to think about five different polluting things they do every day and three non-polluting. He/she asks if they think those activities are necessary or not. He/she also asks if they are very polluting or not much polluting. Then pupils have to write them in the space below and those activities will be use as a reference in the following activity.

### **Activity 4**

The teacher explains that they are going to discuss in pairs. He/she will explain the basic rules of a discussion. He/she will explain that they have some sentences to help during the discussion. He/she will make it clear that they are not stuck on his/her position and they have to reach an agreement. The discussion will be done two times changing the position adopted. It is good to change the pairs as well, so the second time they will discuss with another partner and defend another point of view.

### **Activity 5**

The teacher will ask pupils about their previous activity to see what the agreements pupils have reached are. Then he/she will talk about the problems and the consequences they could cause if those problems are not solved. So he/she will start making few hypotheses and writing them on the blackboard.

Then the teacher will start one hypothesis and he/she will ask a pupil to finish it. After, the students will add more hypotheses on their own.



## Lesson 7

### Activity 1

The teacher gives the handouts and focus pupils' attention on the pictures' differences. He/she asks questions about the air, about how many people they think live there, what they might do, about the kind and amount of vehicles, what might be around the settlements, etc. Then he/she makes them write down the main features and compare them. After, pupils have to answer the question.

### Activity 2

The teacher shows the maps and let the students think for a while; he/she says they can be related to pollution or to other things. He/she guide attention to the maps and make students realize they are nearly the opposite. Then he/she says what are the maps about and students have to answers the questions, first orally and then writing.

The teacher will show lesson 6 worksheet for the last question if he/she considers it necessary.



### Activity 3

The teacher reads aloud the text and asks pupils what they think about it. If it is true or not, he/she makes sure that students understand what a geological era is giving examples of previous eras like the Mesozoic era when there were dinosaurs. Then he/she explains that dinosaurs get extinct and if they think that can be the same with human beings.

### Activity 4

The teacher makes students look at the maps and answer the questions. There are some oral and some written questions. The teacher will ask questions related to the images asking if they think that images are real or false. The written questions will be answered individually and corrected by the teacher later on.

### Activity 5

The teacher asks pupils to write a slogan for the poster done last session and he/she suggests to use a good slogan and to write it with nice letters.

**7. Polluted areas**

Today we think of carbon dioxide as a dangerous **greenhouse gas** that leads to a **global warming** but throughout Earth's long history carbon dioxide has played a vital role in keeping our planet at the right temperature for complex life to survive.

Our influence is now so great that scientists have declared that a new geological era has begun.

Look at the map.



What do you think it is reflecting?

Who do you think should reduce their harmful emissions?

What are the red parts in this next map?



Can you find any similarity between the maps?

Burning fossil fuels to get energy for industry pollutes a lot. What other non-polluting energy sources could be used?

Can cars use non-polluting energy to function?

What must we do before cars use this?

Write a slogan for the poster you did last session.



## Lesson 8

### Activity 1

The teacher explains that they are going to watch a ppt presentation where they will see that air pollution is such a big problem that worries governments around the world and they are taking action to reduce air pollution and stop global warming with it. He/she also says that there is not just a government matter it is a general problem, we can make the difference every day easily just trying to reduce the unnecessary polluting things we do. Then he/she starts the presentation. He/she asks some students to read the slide and he/she explains after every paragraph and check global understanding. The teacher shows slides one, two and three.

### Activity 2

The teacher gives the worksheets to the pupils and explains that they have to draw in the boxes next to each situation. Once they have finished the teacher does the correction using the ppt and he/she can explain why him/herself or ask some students why. The teacher can help to link the sentence with the explanation orally using "because" before the second clause and giving help to build the first clause.

### Activity 3






In this activity the teacher says that they are going to choose two of the previous things they are doing or that they would do from then on and write them in the space left as it is done in the example.

**8. Beating air pollution**

You can make a difference every day:

- > **Save electricity**
- > **Use your own energy**
- > **Recycle**

Draw the symbol in each box.

			
Each time of glass recycled saves 24 litres of fuel.		Going to school on foot.	
			
Don't leave the fridge door open.		Use the car completely and always use when you have filled with gas.	
			

This is why:

- Electricity has to be generated and it largely comes from power stations.
- Walking and cycling instead of using a car is not just good for the planet - it's better for you, too!
- Recycling materials saves resources such as gas and coal from being burnt for power.

### Activity 4

The teacher asks pupils for the name of the elements that appear in the picture. Then he/she asks which are more frequent. After, he/she asks the students to do the first part of the activity where they have to colour the square around each small picture in green or red depending on their nature. In the second part they have to judge which are the two more polluting taking in to account their frequency and amount in the world.

### Activity 5

The teacher explains that the activity contains several dictionary definitions, they belong to the pictures of the previous activity and they have to write the name after each definition.

**8. Beating air pollution**

Explain some of the actions you take in your daily life and some that you do. You can use the previous activity to help.

Ex: In my home I use low energy bulbs to save electricity because electricity has to be generated and it largely comes from power stations.

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Look at the picture and read below.



Square the natural polluting things in green and the human ones in red. Which do you think are the two more polluting?

Match the definitions with the pictures above. Write the names after them.

- A smoke like thing that comes from a chimney, the CO<sub>2</sub> and how a small amount of it.....
- A complex electrical, machinery and apparatus for generating electric energy.....
- A building or group of buildings with chimneys in the middle like in a power station or power.....
- A burning mass of small things, not wood.....
- A mass of or by which someone knows.....
- A rank of or high rank, especially based on power like.....
- A chemical derived from petroleum or an animal.....

## Lesson 9

### Activity 1

The teacher reads the text aloud and focuses attention on important information and the picture. Which elements are in which place, which are the new elements, which are the usual elements.

### Activity 2

The teacher asks some students to interpret the graphic of the car functioning aloud. He/she helps and encourages as the students are explaining it.

### Activity 3

The teacher explains that not all hybrid cars have the same elements, but there are some others that are common. Then he/she says that they have to label the car with the words from the box. They will check their answers with their partners before correcting all together.

The worksheet is titled "New cars" and features a central diagram of a car with various parts labeled. The text on the page discusses the benefits of hybrid cars, such as fuel efficiency and reduced pollution. Below the diagram, there is a word box containing the following terms: Battery, Engine, Electric motor, Inverter, Insulating material, Power split device. The diagram shows a car with a battery pack at the rear, an engine at the front, and an electric motor at the rear. The car is shown from a side view, with the engine and electric motor connected to a power split device. The battery pack is located at the rear of the car. The diagram is labeled with lines pointing to various parts, and the word box is provided for labeling these parts.

**New cars**

The car is one of the biggest polluters. Half of the world's oil is used in vehicles.

New transport is being developed that use less fuel.

Hybrid cars like this use half as much fuel as other cars on the same amount of fuel. At low speeds in city traffic, they run on electricity and at higher speeds on petrol. Most people are concerned about higher fuel costs. They use cars that are more fuel efficient.

Not all hybrid cars are equal. Try to label the car below using the words from the box.

Battery Engine Electric motor Inverter Insulating material Power split device

### Activity 4

The teacher asks the students to say what car would they like to buy when they grow up and he/she will write it in a piece of paper and why. He/she could do it as a survey writing the name of the students in a grid according to the model of car chosen.

### Activity 5

The teacher gives the worksheet to the students and explains that it is a real text extracted from the internet and that he/she hasn't modified it at all. He/she will go on explaining that the text might be very interesting for their parents if they have to change their car. Then he asks them to read it on their own and try to answer the questions below to see if they can get a general picture. The teacher will collect this activity correct it individually.

**Cars taxes**

Changing taxes to reduce pollution: Spain finally adopting CO2-dependent tax system

Finally the Spanish government has announced plans to change the way it taxes cars, and just when it needs it most. The new system, to be started in January 2009, will be based on the CO2 emissions of the vehicles.

Until now, the registration tax was a function of the type of car you bought. It was based on 2.25 Euro (about 3000 pesetas) for the first 1000 cc and 1.5 Euro (about 2000 pesetas) for the rest.

- Below 1000 cc: 1000 pesetas (about 140 Euro)
- Between 1001 and 1500 cc: 1500 pesetas (about 210 Euro)
- Between 1501 and 2000 cc: 2000 pesetas (about 280 Euro)
- Over 2000 cc: 3000 pesetas (about 420 Euro)

The reason for this was the fact that the level of CO2 emissions of the cars was not taken into account. The new system will be based on the CO2 emissions of the cars.

What is the text about?

A) A tax which controls the speed of the cars.  
B) A tax on cars that depends on the CO2 emissions of the vehicles.  
C) A new model of car which speeds more than all the cars shown before.

Do you like buying big cars? Why?

Do you think it is a good measure? Why?

What is the Kyoto protocol?

A) A protocol to buy a new car.  
B) A protocol to reduce the sales of expensive cars.  
C) A protocol to reduce the CO2 emissions to the atmosphere.

Do you know if any other country has a similar tax for cars? Where?

What car would you like to buy?