SCIENCE ACROSS EUROPE

BP Amoco

Road Safety
Sicherheit im Straßenverkehr
Seguridad Vial
Sécurité Routière
Sicurezza Stradale
Segurança Rodoviária

English

Road Safety

This unit is designed to complement work on forces and motion in physics but it also relates to investigations of the properties and uses of materials.

Students carry out surveys, measure reaction times, explore attitudes to the use of safety equipment and discuss ways to improve road safety by applying science and technology.

Students exchange their findings with schools in other countries. Then they discuss similarities and differences and the ways in which science and technology can be applied to improve safety.

The work is also suitable for lessons in social and behavioural sciences because it touches on aspects of the psychology of road users.

This unit is in eight parts

Part 1 Young people at risk on the road
A brief introduction to the topic with a 'brainstorming' discussion.

Part 2 Travelling to school
A travel survey and a map to show hazards close to school.

Part 3 Speed and safety
A simple investigation of reaction times with graphs, charts and questions about speed and stopping distances.

Part 4 Attitudes to road safety
Information about safety equipment with questions. A survey of attitudes to the use of safety equipment. Information about recent research to study driver behaviour, with questions.

Part 5 Problems and solutions
Guidelines for a structured discussion technique to come up with possible solutions to road safety problems.

Part 6 Collating and exchanging information
Instructions for completing the Exchange Form and sending to students in other countries.

Part 7 Road safety in other countries
Questions to help students compare and discuss the responses from different countries.

Part 8 Information section
Tables, graphs and charts comparing road safety in European countries.

The aims of the unit are:

- ❒ to make students understand that science can help people to comprehend road safety issues;
- ❒ to make students aware of the scale of death and injury on the roads of Europe;
- ❒ to allow students to find out how people behave on the roads in different countries;
- ❒ to make students aware of differences in the ways of tackling road safety issues in different countries.

Prior knowledge and skills

❒ **Concepts and knowledge**

Students should be familiar with:
- the concepts of speed, time and distance and the relationship between them
- average (mean) values and percentages
- everyday materials (metals, glasses, plastics, fibres, composites).

❒ **Skills**

Students should be able to:
- read a map
- interpret data and graphs.

Instructions for teachers

Requirements

Before beginning the unit, provide photocopies of the students pages for each group of students

Part 1 - for the discussion activity, each group of students may need a large sheet of paper and a felt-tip pen.

Part 2 - students will need an outline map showing the streets and roads near the school.

Part 3 - students will need a ruler or strip of wood to make the reaction timer in method 1 or a metre rule for method 2.

Part 4 - students need access to safety helmets so that they can study their construction and design. Students may be able to bring in their own helmets to show the class.

Part 6 - students will need a few copies of the Exchange Form to send their findings to other schools. If you have INTERNET access, your students can complete the form on screen and then send it to other schools by E-mail or fax. The URL for the site is **http://www.bp.com/saw** . Until the Science Across the World site has been upgraded, the Exchange Form has to be completed on line. Look out for an announcement that the exchange form can be downloaded and completed off line.

Teaching notes

Part 1 Young people at risk on the road

After the opening discussion, encourage students to look at some of the data in the information section. They might plot charts or graphs to display the data in other ways to illustrate the scale of the road safety problems in Europe.

Part 2 Travelling to school

Some students will need help before calculating percentages and averages.

Part 3 Speed and safety

This section is included to make links with the study of speed, time and distance in physics or mathematics. With some students you may decide to leave out this part so as to concentrate on the activities in the parts needed to complete the Exchange Form.

Note that students can also use a computer to measure reaction times.

Method - with a computer

a Load a program which allows you to measure your response times.

b Follow the instructions on the screen. Hit a key in response to the signal when it flashes up on the display.

c Read off your average reaction time from the screen after a number of trials.

Part 4 Attitudes to road safety

Many young people are interested in human behaviour and in some countries the study of psychology is popular. This part of the unit features a very important aspect of the way in which scientists can use their methods to try and improve road safety by influencing the behaviour of road users.

There is no need for all students to answer all the questions. Question 13, for example, may not be of interest to all students.

Part 5 Problems and solutions

You could decide to shorten the unit by leaving out part 5 and page 3 of the Exchange Form. Some students, however, find this part of the unit very interesting. They may need to add an extra page to the Exchange Form to make room for all that they want to report.

The step by step technique for classifying solutions is typical of problem-solving methods used in industry and commerce. This part of the unit has been written with the help of experts in the oil industry.

An alternative approach can start with the map of hazards which students drew up in Part 2. You might walk out with the students to some of the places where they have identified serious hazards so that they can observe and record the behaviour of road users.

It can be informative to observe what happens at light controlled crossings. How long do pedestrians have to cross the road? Is it long enough or too long? How do pedestrians, of various ages, behave at the crossing?

Students can usefully make measurements of the width of the footpath (pavement) at various places and observe the behaviour of pedestrians. Your students could discuss guidelines for the width of the pavement according to the amount of traffic and the number pedestrians who pass through the area.

In modern health and safety usage in the UK, the terms hazard and risk have distinct meanings, although the distinction cannot easily be translated into some European languages.

Part 6 Collating and exchanging information

When students have completed parts 1-5 they have to decide what to enter on their Exchange Form. They then send copies of the form by post, fax or E-mail to schools in other countries. Note that the exchange can be much richer if students also send, by post, other information such as photographs, road safety leaflets and other local information they have collected while working on the unit. If your school has a Web site on the Internet, you can consider putting up a page to describe the work your students have done on this unit.

Part 7 Road safety in other countries

After receiving Exchange Forms from other schools, the students compare and discuss the responses with the help of questions. They compare their findings with the data in the information section which they can re-present in various ways as charts and diagrams.

Part 8 Information section

Students can display the data in various ways and compare it to the information on the Exchange Forms they have received.

Further activities

Here are some suggestions

1. This unit can be part of a larger study of the science of road safety. Many of the topics in Figure 1 do not feature in this unit because they are the same from one country to another and do not give rise to interesting findings for the Exchange Form.

2. Get students to study and analyse examples of road safety campaigns. They can discuss whether or not the campaigns are likely to affect the attitudes and behaviour of young people on the roads. Students might post examples of road safety literature to the schools to which they are sending their Exchange Form.

3. Ask the students to prepare posters to display around the school to get across the main road safety messages which seem important to them.

4. In some countries cars have to have a test every year or two years to check that they are roadworthy. The test station carries out a series of checks and fills in a form. Ask students to devise a set of tests for a regular bicycle check. They can design a form to fill in while the check is carried out and try it with their own bicycles.

5. Measure the braking distances of bicycles at different speeds, on various surfaces (wet and dry).

6. Arrange a visit to a local motor manufacturer. Some manufacturers run special road safety programmes and are keen to make links with schools.

7. Invite a young person who has had a serious road accident to tell your class about the experience and the consequences.

8. Take your students Go Karting to give them a feeling for speed and the problems of controlling a vehicle travelling fast.

9. Obtain a copy of a version of the official written paper for the driving test (for mopeds, motorcycles or cars). Ask your students to answer the questions. Discuss whether or not the test questions deal with the topics which are important for road safety.

10. Use two water melons to study the effectiveness of safety helmets. Fit one melon with a helmet. Drop both melons onto a hard surface from the same height. Observe the effects. (See also question 13 on page 9.)

11. Investigate the use of materials to absorb the energy of crashes. Model crumple zones using small boxes made of a variety of materials (such as paper, card, plastic, metals and so on). Attach the boxes to a block of wood and drop them from a measured height

Sources of information

Publications from the European Transport and Safety Council:

Reducing Traffic Injuries through Vehicle Safety Improvements - the Role of Car Design, 1993

Reducing Traffic Injuries Resulting from Excess and Inappropriate Speeds, 1995

Reducing Traffic Injuries in EU Countries - a strategic approach 1995

Reducing Traffic Injuries Resulting from Alcohol Impairment, 1995

Briefing papers

- Young Drivers and Rider Casualties what can we do?, 1995

- Child Restraints - current issues for EU consideration, 1995

F.P.McKenna, Taming the Driver

Acknowledgements

The following have contributed to the development of this unit:

Jeanne Breen, Executive Director, European Transport and Safety Council

Professor Frank McKenna, University of Reading, UK

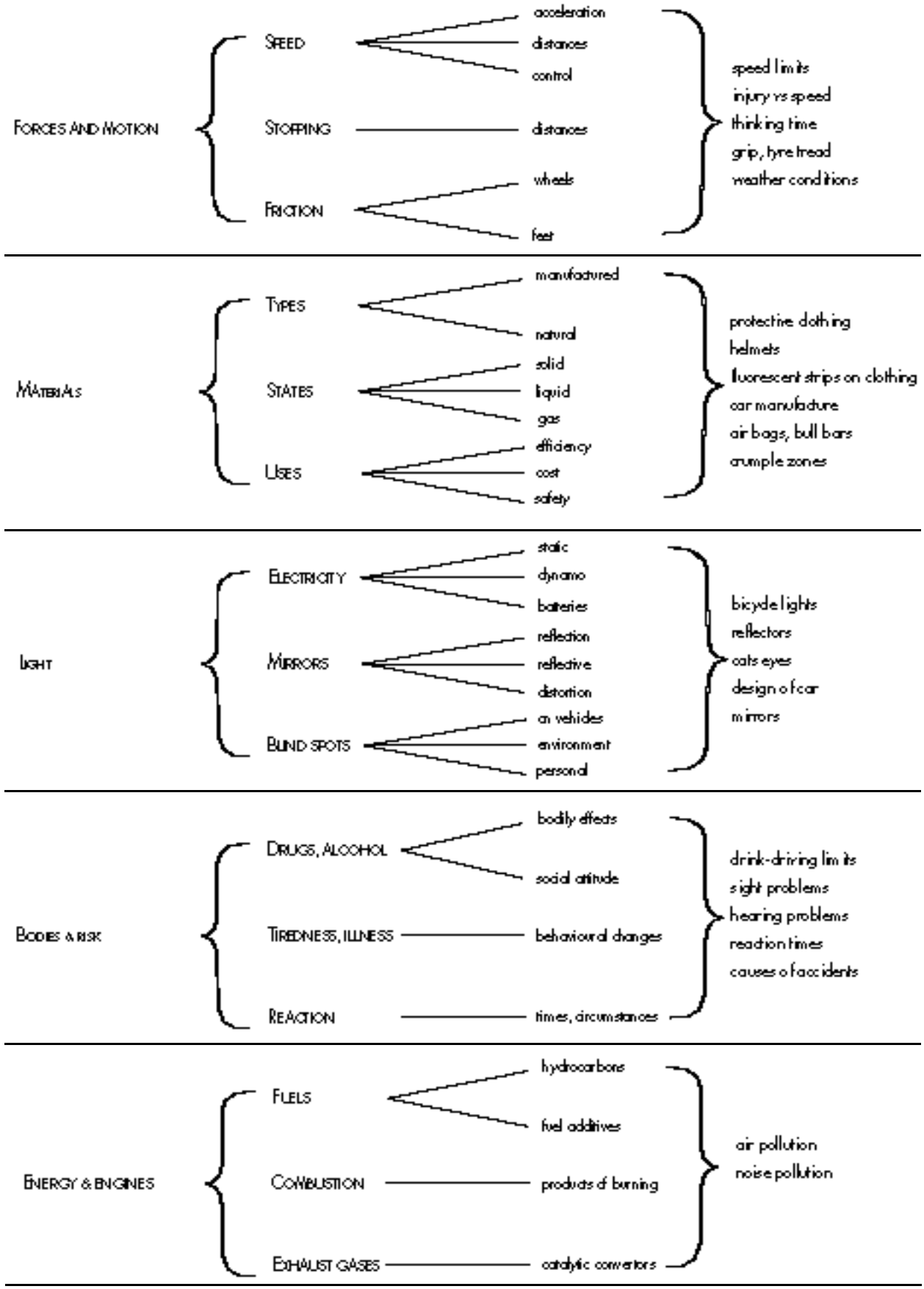


Figure showing Science curriculum topics related to road safety

Science Across the World

Road Safety

Date	
To (teacher's name)	
School	
Address	
Tel: (with international dialling code)	Fax
E-mail	
Web address of school	

From (teacher's name)	
School	
Address	
Tel: (with international dialling code)	Fax
E-mail	
Web address of school	

Here is our report about Road Safety. We look forward to seeing what you have found in your study of the same topic.

How we travel to school

How we travel	Number of students	Percentage of students	Average distance travelled (km)	Average time (minutes)
On foot				
Bicycle				
Moped/Motorcycle				
Private car				
School bus				
Public transport (road)				
Public transport (rail)				
Other (please specify)				

The most common way of travelling to school is used because: . . . . . .

. . . . . .

The closest description of where our school stands is: . . . . . .
(for example: city, large town, small town, village, open country, other)

The longest distance travelled by anyone in our class is . . . . . .

We are including a map with this Exchange Form to show the roads or streets near our school and the main hazards: YES/NO

Attitudes to road safety

Attitudes to using safety equipment

This table shows whether or not we take care to be as safe as possible on the roads. These answers show what we normally do (not just on our way to school).

Type of Equipment	Students who use this type of equipment		Students who do not use this type of equipment	
	Number	Reasons why we do	Number	Reasons why we do not
Reflective material on clothing when walking or cycling				
Safety helmets on bicycles				
Safety helmets on mopeds or motorcycles				
Seat belts in cars				
Other (please specify)				

New drivers

This table shows how many new drivers we have in our class.

	Number of boys	Number of girls
Learning to drive a moped/motorcycle		
Learning to drive a car		
Passed test and have licence to drive a moped/motorcycle		
Passed test and have licence to drive a car		

This is our estimate of the cost of learning to drive and take the test in our country. We have given the costs for mopeds/motorcycles and for cars in local currency and in ECUs

. . . . . .

This is the youngest age for taking a moped/motorcycle test . . . . . years old. For taking a car driving test . . . . . years old.

This is the number of times a person is allowed to take the driving test: . . . . . .

We think that new drivers are more at risk of accidents than older drivers because: . . . . . .

. . . . . .

This is what we think could be done to cut the risk of accidents involving young drivers: . . . . . .

. . . . . .

Problems and solutions

Here are our ideas about making the journey to our school safer by removing hazards and cutting risks.

PROBLEMS Examples of hazards on the roads we find on the way to school	SUGGESTED SOLUTIONS Ideas for reducing the hazards and cutting the risks of accidents and injuries
For students who are pedestrians	
For students riding bicycles or motorcycles	
For students in cars or buses	

Road Safety

Part 1 Young people at risk on the road

Every year, road accidents in Europe kill about 50 000 people and injure 1.5 million others so badly that they end up in hospital. About a hundred people will die on Europe's roads as you work on this unit. Why do we tolerate so much death and injury on our roads? We are unwilling to tolerate much smaller risks from technologies such as nuclear power or the medicines used to treat disease.

Every year in Europe, almost 15 000 15 to 24 year olds are killed in traffic, many of them in accidents involving motor vehicles. The accident rate of young car drivers is five to seven times higher than that of middle aged drivers, for the same distance travelled.

It seems that age is a more important factor than experience. This may be something to do with age and attitudes to risk taking.

Discussion

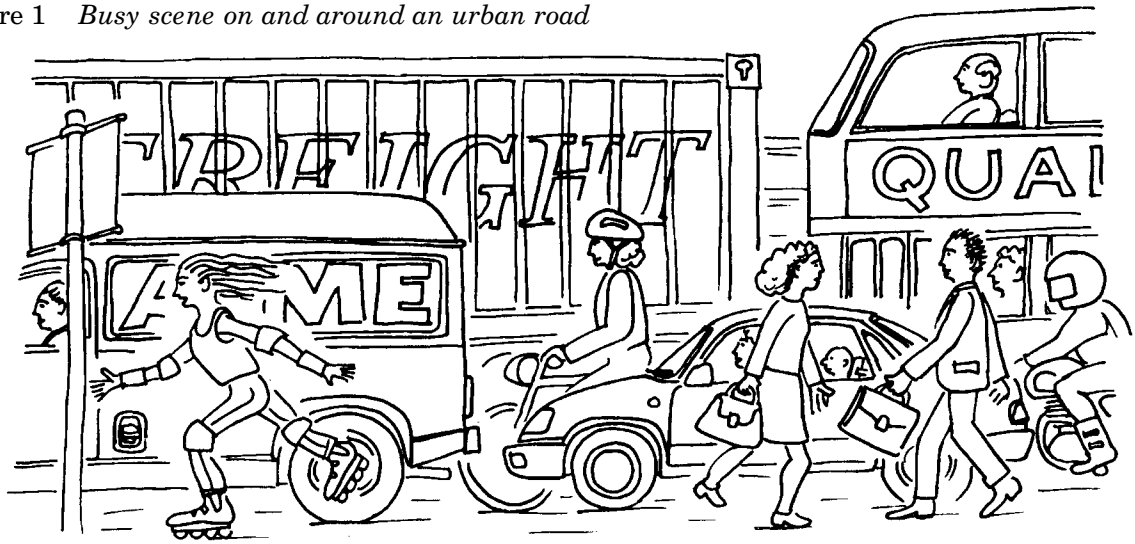
- In a group use 'brainstorming' to throw up lots of ideas in a short time. Base your brainstorm on the two words:

  'Road Safety'

  Everyone in the group is free to suggest ideas. Allow no comments or criticism at this stage. Get one person to note down the ideas on a large sheet of paper with a few key words.

- Now look at all the ideas from your group. What do they tell you about your knowledge and attitudes to road safety before you start work on this unit?

Figure 1 *Busy scene on and around an urban road*



Road safety in Europe

The EU introduced an Action Programme for Road Safety in 1993. Some of the main features of the programme are reflected in this unit:

- collecting and exchanging data to build up a data bank on road accidents (see part 1).
- road user education and training (see parts 3 and 4)
- standards for vehicle safety (part 5)
- standards for the design of road especially for the road network across Europe (part 5).

The EU also has working groups seeking agreement about drinking and driving and regulations affecting young drivers (see part 4). Progress towards agreement and action has been slow. An EU Commission proposal setting an upper blood alcohol limit of 0.5 promille (Information section, table 9) was drafted in 1989 but has not become law.

Part 2 Travelling to School

Young people have more than their fair share of accidents as pedestrians and cyclists. During the week most of the accidents happen in the morning or afternoons as students are on their way to and from school.

Planning for safer transport has to be based on accurate information. In this part of the unit you are going to collect data about the way students in your class make their journeys to school. You will then analyse the data ready to compare it with data from students in other countries

Statistics from Europe

- In the UK one in fifteen people are involved in a road accident by the time they are 15 years old.
- Young pedestrians in the UK, aged 10-15, are twice as likely to be killed or seriously injured in a road accident than the average for all age groups.
- A third of all cyclists killed or seriously injured on the roads each year in the UK are under 15 years old.
- In 1996, over 10 000 children have been injured in road accidents in Poland.

Travel Survey

a Carry out a survey in your class to find out:

- the way students travel to school (on foot, by bicycle or motorbicycle, by private car, by school bus, by public transport - road or rail, or by other means).
- how far students travel to school
- the time taken to travel to school
- the reasons why students travel in the way they do.

b From your results work out:

- the percentage of students travelling by each method
- the average distance travelled by each method
- the average time by each method

c Present your findings in a table, like the first one on the Exchange Form

How we travel	Number of students	Percentage of students	Average distance travelled (km)	Average time (minutes)
On foot				
Bicycle				

d Identify hazards

- Take a local road map. Draw in the route you follow to get to school. Mark in the places where there are hazards which can make your journey risky.
- Work together with the rest of the class to produce a single map showing all the main hazards which affect students on their way to school. You can add this map to the Exchange Form.

Part 3 Speed and safety

Speed

Speed is at the heart of the road accident problem. At higher speeds drivers and riders have less time to avoid collisions. High speed also means that accidents are more serious.

A driver who perceives a hazard has to decide how to avoid it. The driver has to choose between steering out of the way, braking or accelerating. Reaction time is the time lag between seeing the hazard and taking action to avoid it. Reaction time depends on age, driving experience, alertness and physical fitness. Reaction time is also affected if the driver is affected by alcohol or other drugs.

Statistics

- A 1 km/h cut in average traffic speed typically cuts the number of accidents by 3 per cent.
- 5 per cent of pedestrians die if struck by a car travelling at 32 km/h but at 64 km/h about 85% die.
- For car passengers the chance of death at 80 km/h is 20 times greater than at 30km/h

Investigating reaction times

a Use the procedures on pages 6 and 7 (or some other methods you suggest) to investigate the reaction times of the students in your class. Investigate the effects to some of the following on reaction times:

- fatigue—do the tests at the start of the day and then after school
- attention—compare the results when the subject is looking at the rule with the results when the subject is looking to one side
- taking vigorous exercise
- music or noise from headphones

Compare the reaction times for the same person with their hands and with their feet.

b Draw a chart or graph to display the results of your investigation of reaction times

c How do reaction times with hands and feet compare for the same person?

d What happens to your reaction time when you are tired?

e What are the other factors which can affect reaction times?

f What is the significance of your findings for car drivers?

Stopping distances

Reaction (or thinking) **distance** is the distance travelled during the reaction time

reaction distance = reaction time x average speed during this time

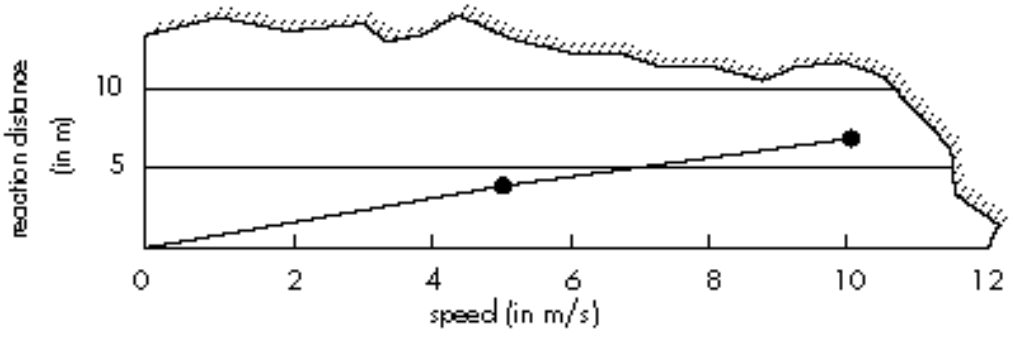


Figure 2

Figure 2 shows how reaction distance varies with the speed of the vehicle for a typical driver. Note that 1 m/s is equal to 3.6 km/h. Gradient depends on the reaction time of the driver.

Stopping distance is the distance travelled between the point at which the driver sees the hazard and the point where the vehicle stops.

total stopping distance = reaction distance + braking distance

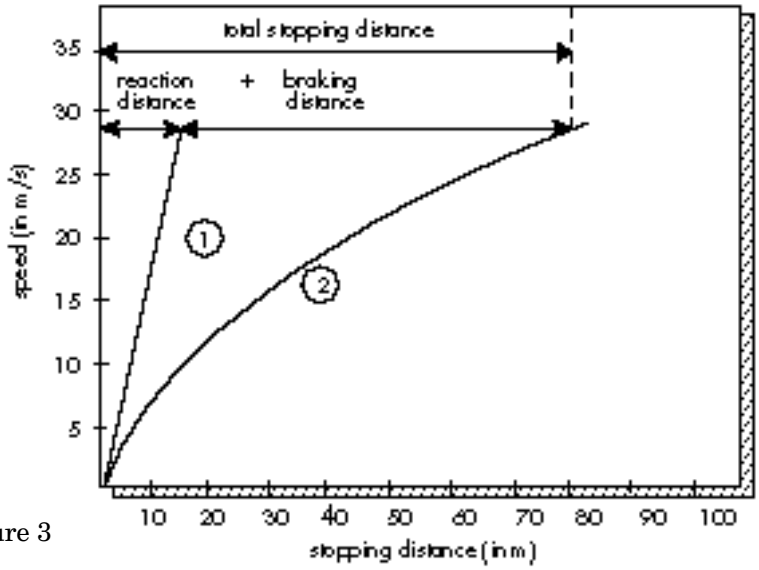


Figure 3

Figure 3 shows how the reaction distance and braking distance change with speed for a typical driver and car. Line 1 shows how reaction distance varies with speed. Line 2 shows how the total stopping distance varies with speed.

Figure 4 shows how the braking distance varies with the type of road and the weather conditions.

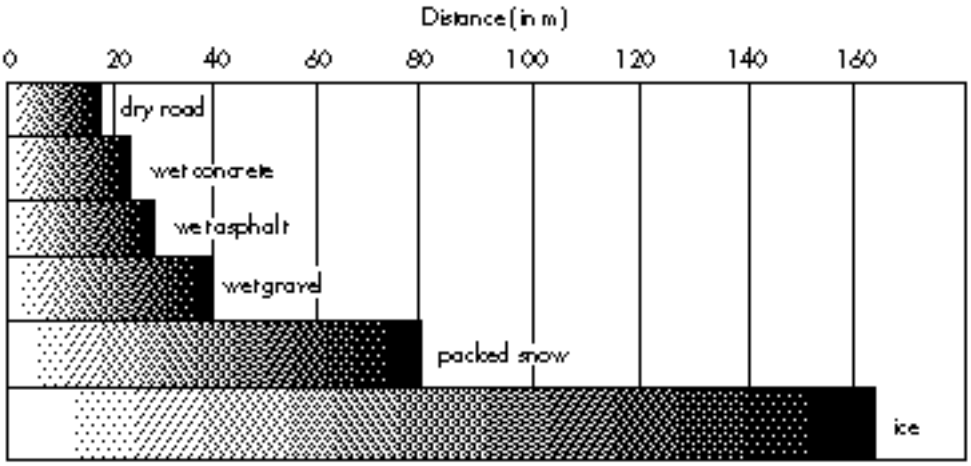


Figure 4

Questions

1 *Calculate the reaction time of the driver from the graph in Figure 2.*

2 *Look at Figure 3. Explain why the line showing the reaction distance is straight, while the line showing the total stopping distance is curved.*

3 *A driver in a car travelling at 72 km/h braked but was just unable to avoid knocking down and injuring a pedestrian on a dry road in a built up area. The driver was breaking the speed limit of 50 km/h.*

(Note that a speed of 3.6 km/h is the same as 1 m/s. So divide the speed in km/h by 3.6 to get the speed in m/s.)

What was the reaction distance and braking distance (from Figure 3)?

What was the total stopping distance?

What would the stopping distance have been at 50 km/h?

Do you think that the driver could have avoided injuring the pedestrian if travelling at the speed limit on packed snow or ice?

4 *What advice would you give to drivers on roads with lots of traffic based on Figures 3 and 4?*

Journey times

Cutting traffic speeds by just 5 km/h could save over 11,000 deaths and 180,000 injuries each year in the EU.

Cutting speeds does not make a big difference to journey times as Figure 5 shows

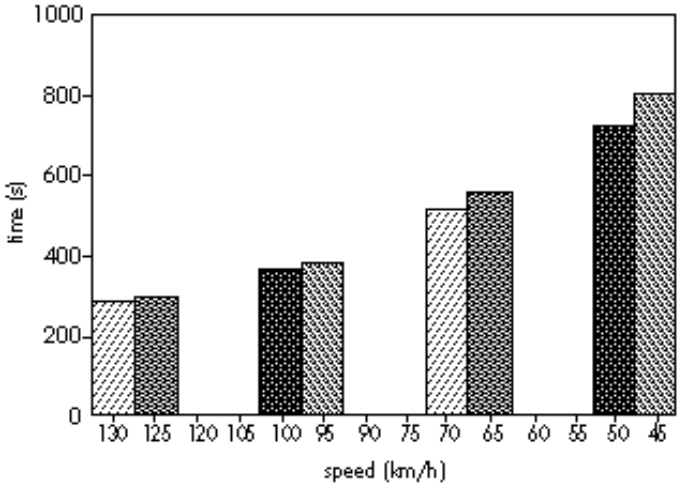


Figure 5 *Extra time taken for a journey of 10 km when the speed is cut by 5 km/h*

Questions

5 *Should drivers be willing to cut their speeds by an average of 5 km/h to save accidents in view of the figures in Figure 5?*

6 *Why do most drivers drive faster than the statistics suggest is safe or sensible?*

7 *What changes would you like to see brought in to limit traffic speeds? Consider changes to the design of cars, to the design of roads and to the laws which affect drivers.*

Visibility

Thousands of cyclists are killed and injured on the roads each year. One of the main problems is that drivers do not seem to notice riders until it is too late to avoid an accident. So it pays to be visible at all times. Fluorescent materials help visibility by day and at dusk. Reflective materials make riders more visible at night.

Motorcyclists should ride with dipped headlights by day and by night.

Pedestrians are at risk too, especially when crossing the road when it is dark or visibility is poor.

Figure 6

Questions

8 *Why do you suppose that drivers do not notice cyclists?*

9 *Use the ideas of reaction distance and braking distance to explain why a cyclist wearing reflective materials at night is less likely to be injured.*

10 *What precautions would you take:*
as a jogger in town early in a winter evening
as a cyclist riding in fog
as a road worker repairing the road on a wet day
as a pedestrian on a country road at night

11 *Use the information about stopping distances to decide whether or not an accident is likely if a driver first sees a pedestrian crossing the road:*
15 m away when travelling at 50 km/h
15 m away when travelling at 80 km/h
30 m away when travelling at 50 km/h
30 m away when travelling at 80 km/h

Measuring reaction times

Method 1 - with your hands

a Stick the paper strip from the edge of this page to a ruler or strip of wood.

b Carry out the test as shown in Figure 7.

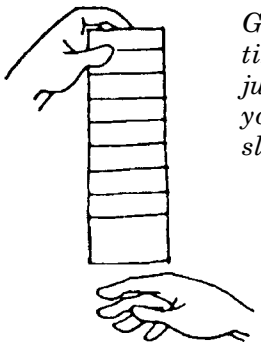
c The tester releases the test strip without warning.

The subject watches the strip and tries to trap it with finger and thumb as quickly as possible.

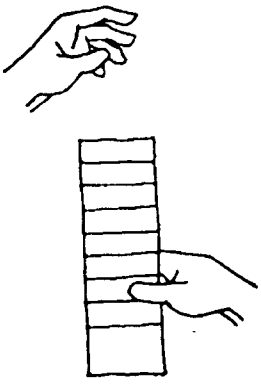
d Read off the reaction time from the scale.

e Repeat these steps several times and take an average value.

Instructions



Get a partner to hold the timer by the top vertically just above your hand, with your finger and thumb slightly open.



When your partner releases the timer, close your finger and thumb and try to catch the timer as low down as possible without dropping your hand.

Figure 7 *Testing hand-to eye co-ordination by measuring reaction times*

Method 2 - With your feet

a Carry out the test as shown in Figure 8 using a metre rule.

b The tester releases the rule without warning. The subject tries to trap the rule with a foot as quickly as possible.

c Note distance the rule falls, then read off the reaction from Figure 9.

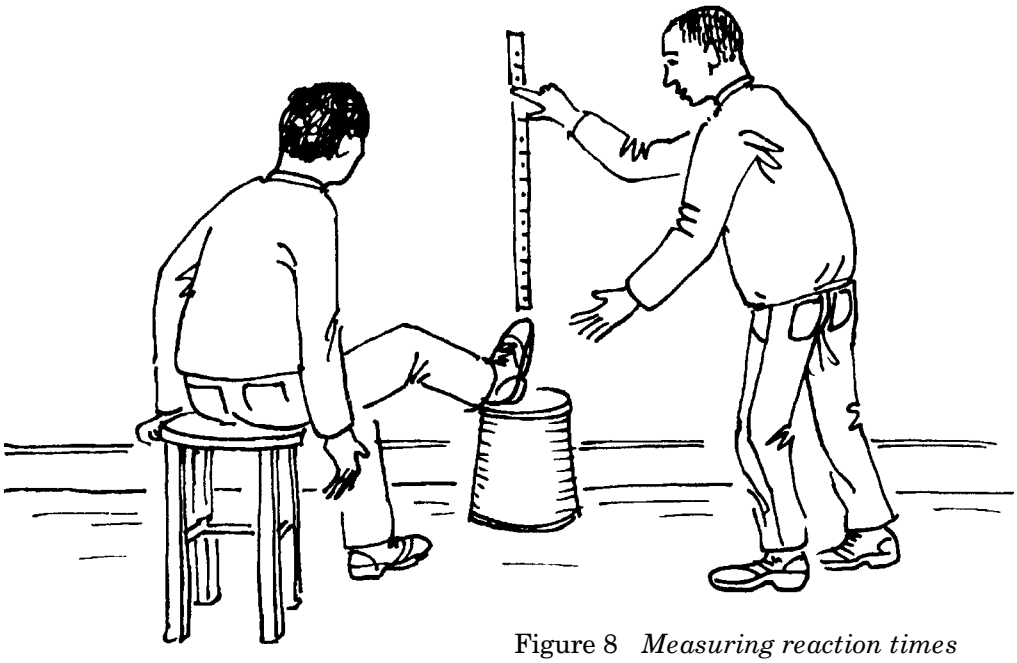


Figure 8 *Measuring reaction times*

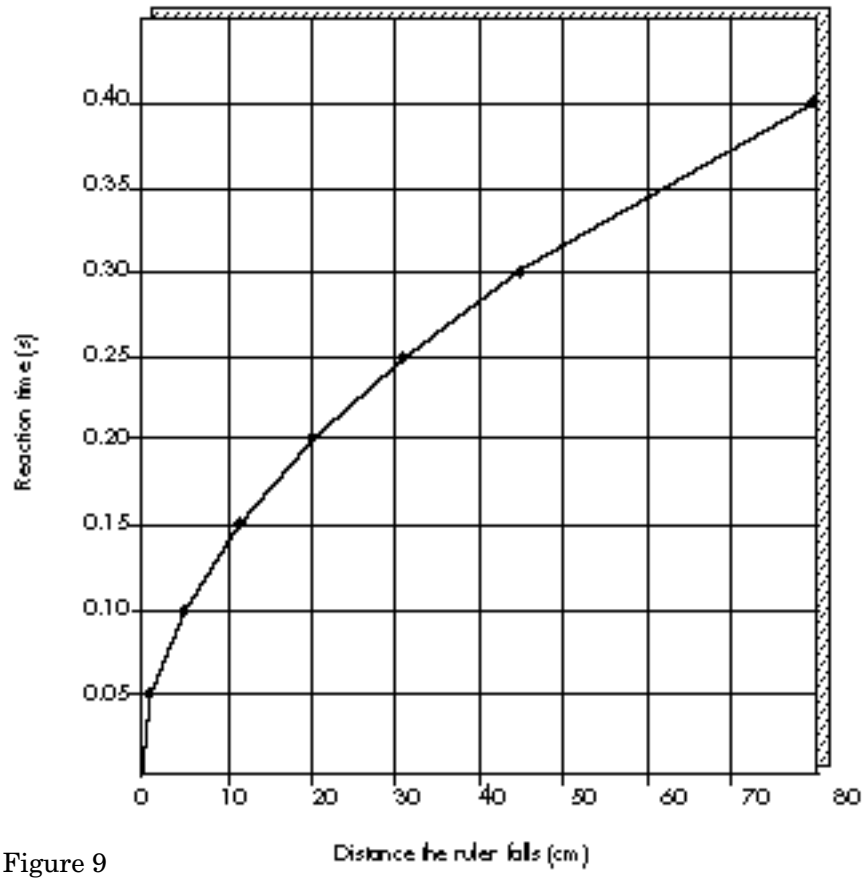
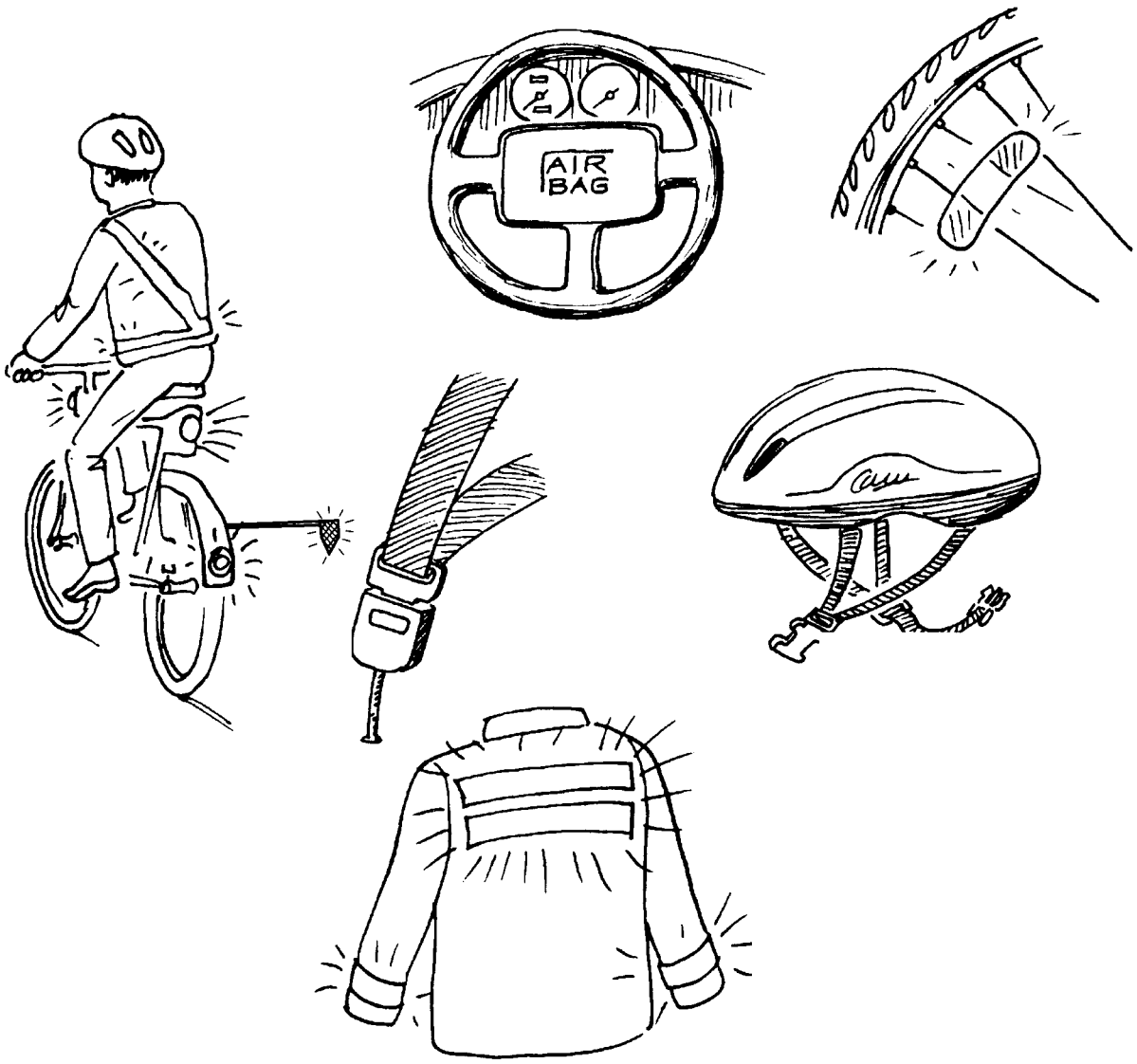


Figure 9

Part 4 Attitudes to road safety

Attitudes to safety equipment

The illustrations on this page show some of the common safety equipment



Survey

- Make a survey of the students in your class to find out whether or not they use the safety equipment shown in Figure 10. Use your findings to fill in the table on page 3 of the Exchange Form.
- What reasons do students give explain why they do, or do not, use safety equipment to cut the risk of accidents or injury on the roads?

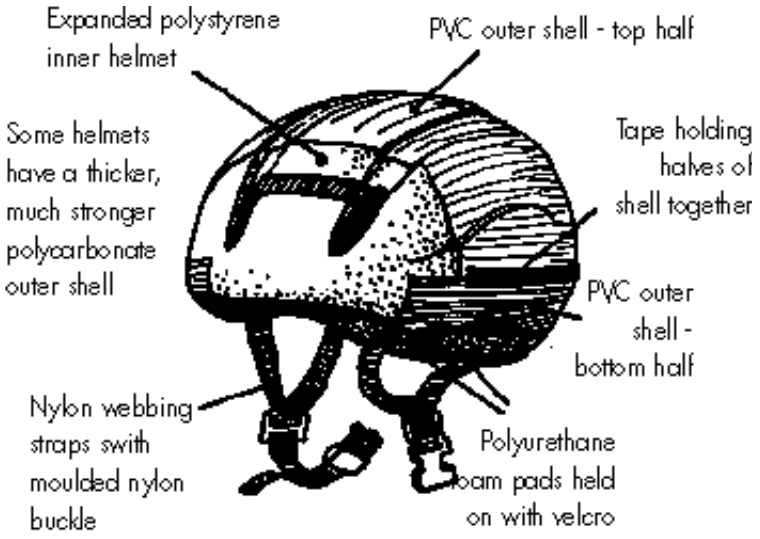


Figure 11 *Cut away, labelled diagram of a safety helmet to show the materials used to make it.*

Questions

12 *What materials are used to make safety helmets?*

What are the properties which make these materials suitable?

13 *Imagine that you work in a laboratory set up to test consumer products. Suggest a method for comparing the effectiveness of different safety helmets.*

New Drivers

Recent research by psychologists shows that drivers overestimate their skill as drivers and underestimate the likelihood that they will have an accident. The danger of these beliefs are that drivers do not take enough care. Why protect yourself from something which is not going to happen?

At the University of Reading in the UK, psychologists have used simulators to see how quickly drivers respond to dangerous situations. During the test the driver watches a screen and has to press a button the moment a hazard appears.

Questions

14 *How many students in your class are learning to drive? How many driving lessons do people usually need before they take a test? How much do the lessons cost? Are driving lessons given by government schools or by private schools?*

15 *What is the driving test like in your country? How many times is someone allowed to take the test? How old are you when you can first take your moped/motorcycle test and your car driving test?*

16 *Do drivers have full freedom of the road (including motorways) as soon as they have passed the test? Do you think that there should be limits on new drivers affecting where they can drive or how fast they can drive?*

17 *What might be the most effective way of cutting the risk of accidents involving young drivers?*

Part 5 Problems and solutions

In this part of the unit you are going to identify some of the main hazards for students on their way to school. You are going to suggest ways of getting rid of the hazards and cutting the risk of accident and injury.

Follow steps 1-5 to tackle this part of the unit.

Hazards

A hazard is something which has the potential to cause harm. A car parked near a school entrance is a hazard.

Risks

Risk is a measure of the likelihood that people will be harmed by a hazard. Risk measures the chance that a student leaving school will step out from behind a parked car and get knocked down by a passing vehicle.

Step 1: Identifying problems

Divide into groups. List all the hazards you identified in Part 2 of this unit which put students at risk as they travel to school. Include the problems which face pedestrians, cyclists or motorcyclists and those who travel in cars or buses. Write down all the problems on a sheet of paper.

Step 2: Ranking problems

Get together as a class and share your ideas. Compare and discuss the hazards and risks identified by all the groups. Agree on a final combined list. Now rank the problems—number them to show which of them are very serious and which are less serious.

Step 3: Suggesting solutions

Now go back into your small groups. Each group takes of one of the problems which involves a serious hazard. Suggest as many possible solutions which reduce the risks or get rid of the hazard.

Step 4: Classifying solutions

Use the grid to categorise your suggested solutions. In the bottom left square, for example, write the suggestions which are not important and are difficult to do anything about.

Step 5: Reviewing the promising solutions

Concentrate on the solutions you have written into the shaded box in the grid.

These are the solutions which are easy to implement and likely to be effective. Discuss:

- what students, parents or staff of your school might do to implement the solutions (self-help)
- what help the school needs and from whom (such as local officials, police, politicians) to implement the solutions which are not suited to self-help.

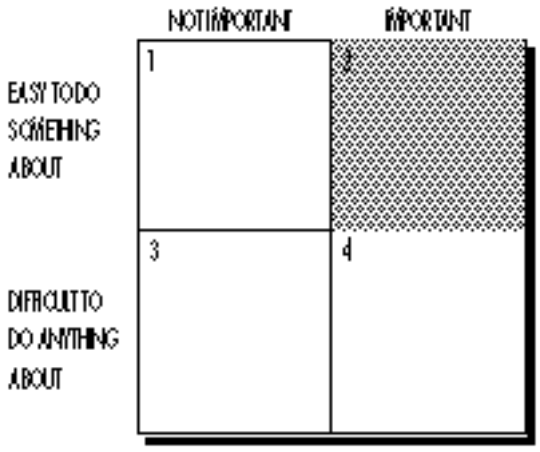


Figure 12

Part 6 Collating and exchanging information

In this part of the unit you will exchange some of the information you collected in parts 2-5 with students in different European countries, and even across the world.

Your teacher will give you an Exchange Form. As a class, decide what information to put on it.

Send the form to other schools across Europe and in other countries by post, fax or E-mail. Your school has a list of classes in other countries that are studying the same unit of work. You will receive Exchange Forms from other schools in return.

If you have INTERNET access you can complete and send the Exchange Form on line at this World Wide Web site: **http://www.bp.com/saw .**

Part 7 Road safety in other countries

When you have received replies from other countries, discuss these questions.

Discussion questions

1 *What have you found out about the ways in which students travel to school in different countries? What are the findings which surprise you? What are the implications for road safety and for the environment? Should communities, local authorities and governments be trying to encourage students to change the way they travel to school?*

2 *What differences in attitudes to road safety have you found in the Exchange Forms from other countries?*

3 *According to the Exchange Forms, how much trouble do young people take to protect themselves on the roads in different countries? Should there be Europe-wide laws to force people to use safety equipment?*

4 *To what extent do students in different countries agree or disagree about the main problems of safety on the roads and the ways of solving the problems.*

5 *Mass media publicity about road safety issues often fails to get through to the young people who most need to understand the hazards and risks. What would you do to encourage younger people to be safe on the roads?*

6 *Young and inexperienced drivers are more likely to have accidents. Would you approve of any of the following?*
- *Temporary licences for new drivers leading up to a second test.*
- *A special penalty points system during the first years of driving which would lead to loss of licence and retraining of drivers involved in too many offences.*
- *Restrictions to limit the freedom of new drivers to drive above a certain speed, to drive at night or drive on motorways.*
- *Limiting the power and performance of the cars or motorcycles which people are allowed to drive for a time after passing the test.*
- *Introducing a lower legal limit for the Blood Alcohol Concentration for young drivers.*

7 *There are three main ways of trying to stop people driving too fast: designing roads and their surroundings, imposing and enforcing speed limits and by educating/training drivers. Which of the following methods are likely to be effective? Which methods would you like to see adopted in all European countries?*
- *Making bigger differences in design between three types of road: high-speed roads to speed the flow of traffic; distributor roads connecting town centres and residential areas to the main roads; and low-speed roads for local access—with traffic calming methods in built-up areas.*
- *Using technology to enforce speed limits (for example speed cameras, automatic policing systems, speed limits on vehicles).*
- *More publicity campaigns to get across the message about the dangers of driving too fast: general mass media campaigns, local publicity and immediate messages to drivers from signs beside the roads.*
- *Introducing a system to make sure that penalties are enforced on drivers who commit offences wherever they are in the EU.*

Part 8 Information section

Road deaths per 100,000 population:

	Ages 0-14	Ages 15-24	Ages 25-64	Ages 65+	All Ages
EU COUNTRIES					
Austria	4.2	29.7	14.4	17.6	16.7
Belgium	4.2	26.4	14.4	14.8	14.3
Denmark	3.1	21.9	1.6	19.9	11.2
Finland	2.9	13.0	7.6	16.5	8.6
France	3.6	27.9	15.7	17.5	15.3
Germany	3.1	27.9	10.6	12.1	11.6
Germany (East)	4.8	48.9	17.7	15.0	18.9
Germany (West)	2.7	22.6	8.9	11.5	9.9
Greece	4.4	33.9	21.7	25.3	21.1
Ireland	3.4	20.4	10.5	16.2	12.1
Italy	2.6	19.3	10.9	17.4	12.3
Luxembourg	4.2	29.2	21.0	18.2	18.5
Netherlands	3.1	14.3	7.6	15.2	8.6
Portugal	8.6	3.1	14.3	7.6	28.8
Spain	3.5	21.0	15.8	14.7	14.7
Sweden	2.0	8.7	5.9	11.4	6.5
United Kingdom	2.2	12.5	5.6	9.6	6.4
NON-EU COUNTRIES IN EUROPE					
Hungary	3.8	17.8	17.5	18.3	15.6
Norway	2.2	15.5	5.2	11.5	7.0
Switzerland	3.2	18.9	8.4	16.0	9.9
NON-EUROPEAN COUNTRIES					
Australia	3.3	21.8	10.3	15.5	11.2
Canada	3.7	21.1	10.7	15.3	11.3
Japan	2.1	15.3	7.9	22.0	10.1
New Zealand	6.3	33.5	14.9	13.4	16.2
USA	4.8	29.2	15.8	20.8	15.9

Source: *IRTAD 1997*

Table 1 *Selected risk values for the year 1995*

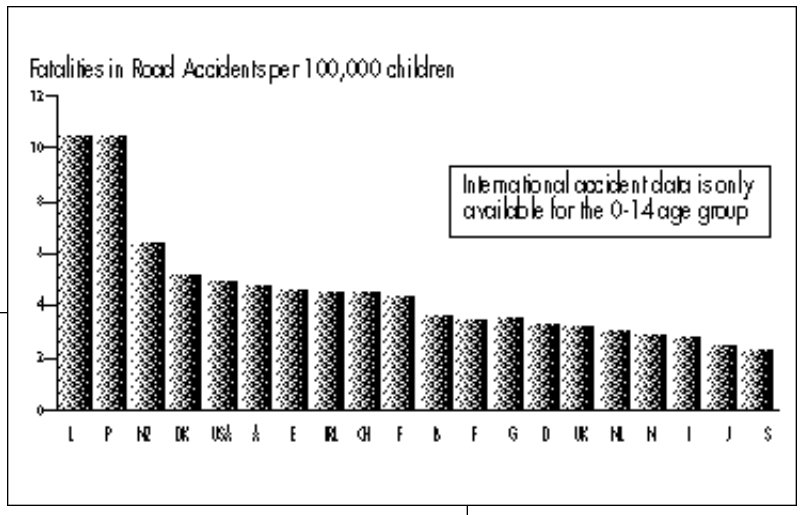


Table 2 *International comparisons: Child deaths; 1991*

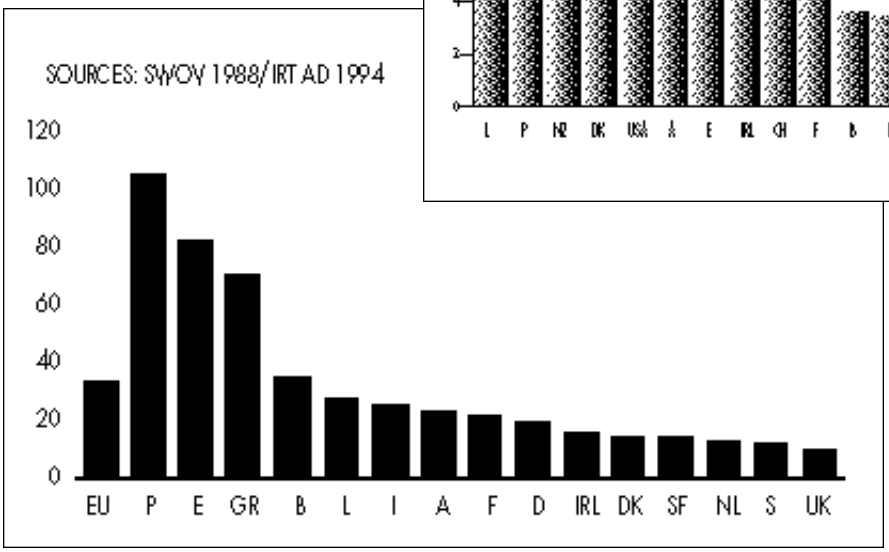
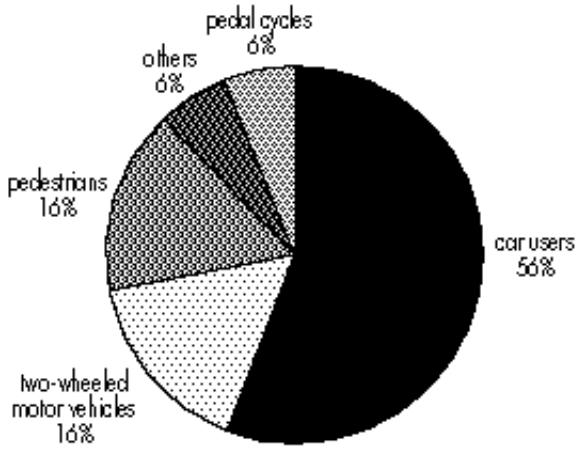


Table 3 *Death Rates—EU countries per billion vehicle kilometres*



Source: *IRTAD 1997*

Figure 1 *Deaths by user group as a percentage of all road deaths 1995*

Country	Road deaths per 100,000 population	Number of road deaths
United Kingdom	6.8	3957
Sweden	7.0	632
Norway	7.0	281
Netherlands	8.0	1252
Switzerland	10.0	723
Finland	10.0	484
Denmark	11.0	559
Germany	12.0	9949
Italy	13.0	7177
Austria	16.0	1283
Belgium	16.0	1660
Spain	16.0	6378
France	17.0	9568
Luxembourg	18.0	73
Greece	20.0	2104
Portugal	33.0	3084

Table 4 *Average figures for all ages (compare with Table 1)*

	EU Total	D	I (1994)	UK	F	E	NL	P	B	GR (1994 total)	S	A	DK	FIN	IRL	L
Car users	25752	5929	3869	1827	5696	3201	657	952	930	841	371	708	290	231	193	57
Pedestrians	7471	1336	1024	1085	1086	1000	142	598	149	467	71	200	118	72	113	10*
Two wheeled motor vehicles	7172	1095	1332	454	1322	865	207	793	187	566	41	152	63	33	37	5
Pedal cyclists	2757	751	437	217	395	123	267	96	128	28	57	77	77	74	28	2*
Other																0
Total users	45892	9454	7033	3765	8891	5751	1334	2710	1449	2195	572	1210	582	441	437	68

Source *IRTAD 1997* **1994 figures*

Table 6 *European Union road deaths 1995*

	50 km/h* urban roads	80/90 km/h rural single carriageway	100/110 km/h expressways	100-130 km/h motorways
Denmark Danish Rd Dir. 1994		67		40
Finland (Mäkinen, 1990)		52	23	15
France (ONSR, 1994)	64	58	44	40
Great Britain (DoT, 1993)		7	39	56
Ireland (Crowley, 1991)		36		
Netherlands (SWOV, 1994)		40		20/55**
Spain (DGT, 1993)	71	16	22	25

Table 7 *Percentage of cars exceeding general speed limits in different countries*

* Monitoring of local 30km/h limits in residential areas in Germany found 74 per cent of cars exceeding them (Blanke, 1993), and that of local 30 and 40 km/h limits in Catalonia 97-98 per cent (GdeC, 1992/1993).

** 20 per cent where the limit was 120 km/h and 55 per cent where it was 100 km/h

DATE	COUNTRY	TYPE OF ROAD	LIMIT CHANGE	SPEED EFFECT	FATALITIES
1985	Switzerland	Motorway	130 km/h → 120 km/h	5 km/h decrease in main speeds	12% decrease
1985	Switzerland	Rural roads	100 km/h → 80 km/h	10 km/h decrease in mean speeds	6% decrease
1985	Denmark	Roads in built up areas	60 km/h → 50 km/h	3-4 km/h decrease in mean speeds	24% decrease
1987	USA	Interstate highways	55 mph → 65 mph	2-4 miles/h increase in mean speeds	19-34% increase
1989	Sweden	Motorways	110 km/h → 90 km/h	14.4 km/h decrease in median speeds	21% decrease

Table 8 *Examples of effects of changes in speed limits (From: Finch et al, 1994)*

COUNTRY	BLOOD ALCOHOL CONTENT IN mg/ml (promille)
Austria	0.80
Belgium	0.50
Denmark	0.80
Finland	0.50
France	0.50
Germany	0.80
Great Britain	0.80
Greece	0.50
Ireland	0.80
Italy	0.80
Luxembourg	0.80
Netherlands	0.50
Portugal	0.40
Spain	0.80
Sweden	0.20

Table 9 *Blood alcohol limits in the European Union (December 1994)*