

About this program

Making money from the delivery service, or even just travelling around Britain quickly and efficiently will call for quick calculations of time, distance and money. If presented in a text book these sums would be boring, but when they are an essential part of a computer game children will tackle them happily.

Car Journey will not only introduce the position and relative distances between Britain's major towns, it will also develop your child's understanding of more complex ideas such as rate of fuel consumption.

This book is full of activities and ideas which take the topics introduced in the program further.

Children will enjoy playing and learning with *Car Journey*.

M5

Choose
your
road



TOTAL DISTANCE

000075 km

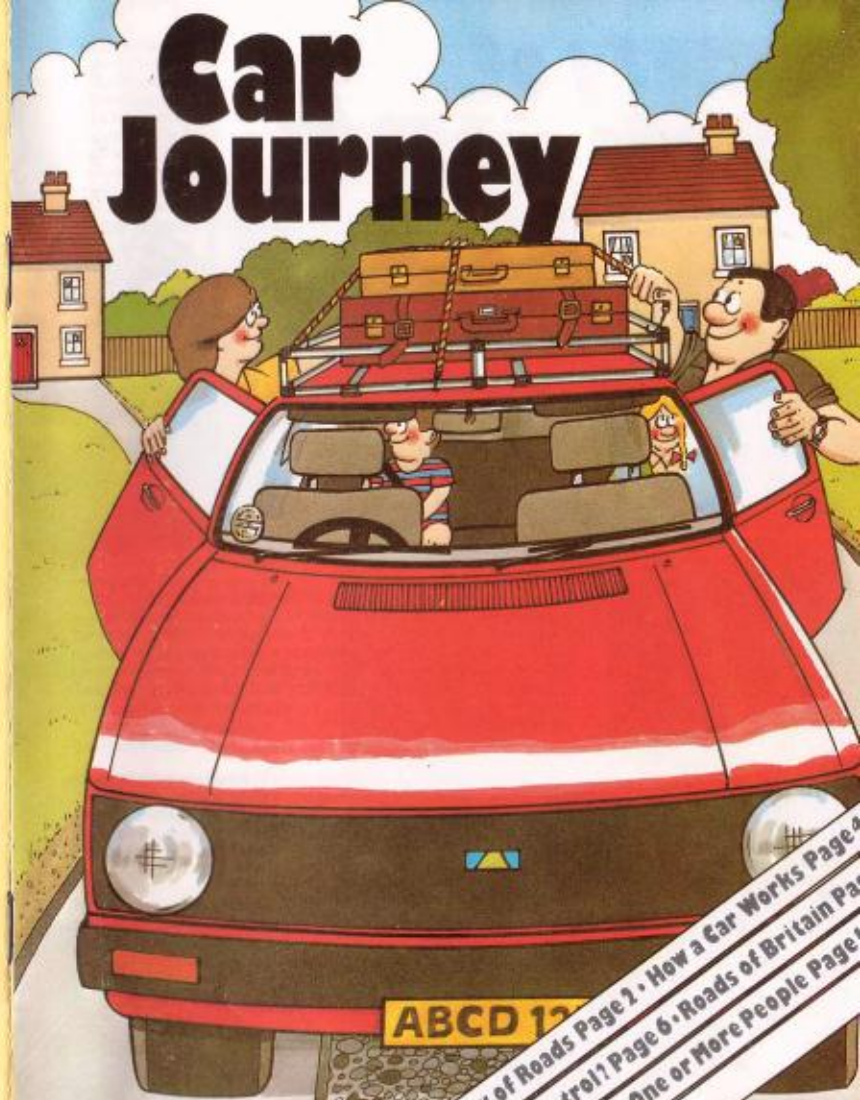
FUEL (litres)



TIME 12:34



Car Journey



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History of Roads



The Ridgeway

The Ridgeway is thought to be one of the oldest roads in Britain. It goes across the chalk and limestone hills in the south of England. It may have been there since the old Stone Age, before Britain became an island. Perhaps the earliest settlers came along this road into England. Because it went along a ridge, the road was easy to follow and it stayed dry. This was very important in the days before roads had proper drainage and hard surfaces. In wet weather, many roads became a mass of mud.

The Romans

The first people to build proper roads in Britain were the Romans. They needed plenty of good roads for their soldiers to march on and to make it easy to keep in touch with Rome. They built 5,000 miles of roads - as straight as possible from one town to the next. Some of our roads today still follow the straight lines of the old Roman roads.



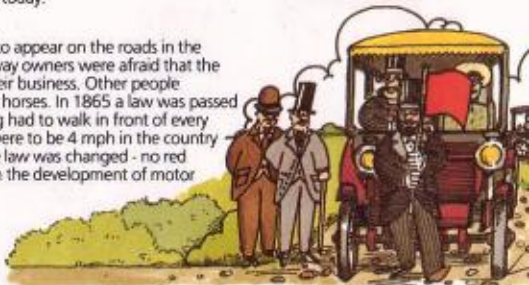
Road Builders

In the centuries after the Romans left Britain, nobody was responsible for looking after the roads and they became very bad again. The state of the roads varied from one part of the country to another. Many were too narrow and the poor surfaces made journeys slow and uncomfortable. It was not until the early nineteenth century that men like Thomas Telford and John McAdam made great efforts to improve the roads. Telford designed strong roads with proper drainage. He rebuilt the 260 mile road from London to Holyhead in North Wales. He built a suspension bridge to take the road over the Menai Straits to the island of Anglesey. This bridge, like most of Telford's bridges (and many much older ones), is still in use today.



Red Flag Act

The first 'horseless carriages' began to appear on the roads in the 1830's. They ran on steam. The railway owners were afraid that the steam carriages would take away their business. Other people complained that they frightened the horses. In 1865 a law was passed which said that a man with a red flag had to walk in front of every horseless carriage and speed limits were to be 4 mph in the country and 2 mph in the town. In 1896, the law was changed - no red flags and a 14 mph speed limit. Then the development of motor cars really began.



Modern Roads

Between the two world wars, more and more cars, lorries and buses poured on to the roads and horse-drawn vehicles became less common. There were some improvements in road surfaces, but the roads were still the same ones that had been used for hundreds of years by horse-drawn traffic. It was not until the 1950's that we began to plan special roads for cars. Then we started to build dual carriageways, by-passes, and motorways.

Motorways

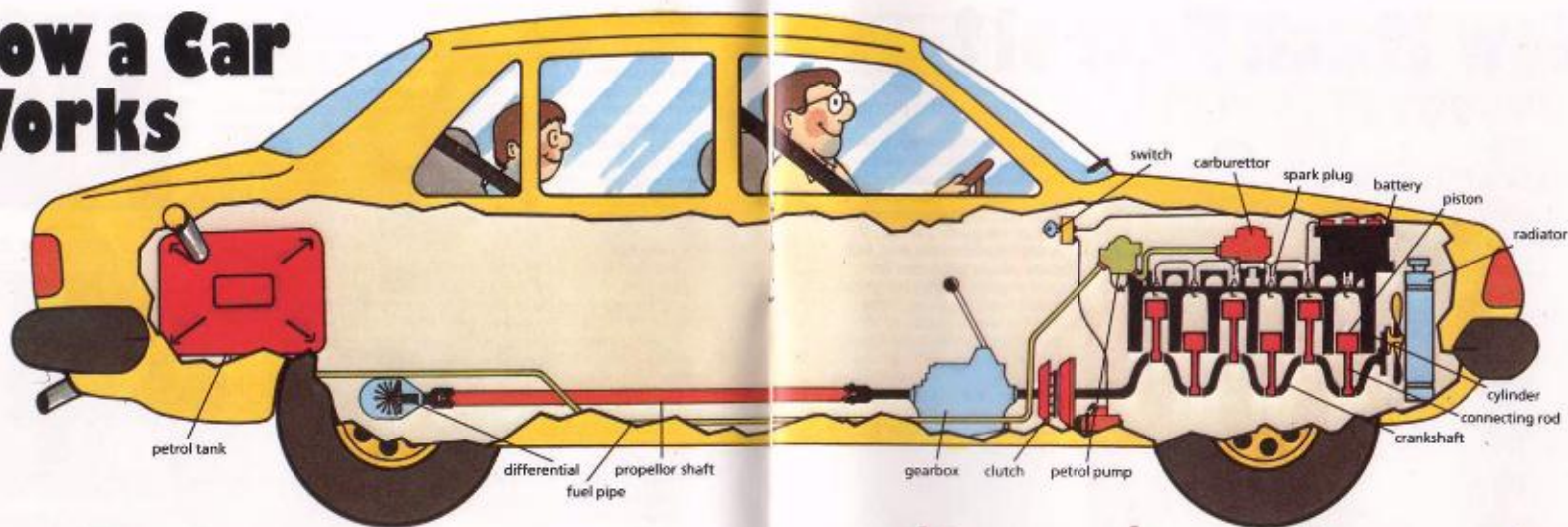
The first motorway, the M1 joining London and the North, was opened in 1959. Now we have many more motorways - you can see some of them on the map on pages 8 and 9. Motorways are designed to allow motor vehicles to travel long distances safely at a steady speed. They have no sharp corners or steep hills. There are no crossroads or side roads. Traffic joins and leaves the motorways smoothly and safely at specially designed junctions. The picture shows the famous junction near Birmingham where several roads join up with the M6. Perhaps you can see why its nickname is 'Spaghetti Junction'.



Activities

- 1 Ask the oldest person you know what roads and cars were like when he or she was a child.
- 2 Think of a car journey you know well. Can you remember how many bridges you go over or under on this journey? Why are they needed? How old do you think the bridges are?
- 3 Watling Street was one of the Roman Roads. It went from Dover, through London and on to Chester. The A5 still follows some of the same route today. Can you find the A5 on a map? (Start near Luton.) Look for places where it runs very straight - these are probably the places where it follows the line of the old Roman road exactly.

How a Car Works



The large picture shows you a car sliced open down the middle so that you can see some of the inside workings. This car has the petrol tank at the back and the engine at the front. In some cars the engine is at the back. The engine in this car pushes the back wheels round. How does the engine do the pushing?

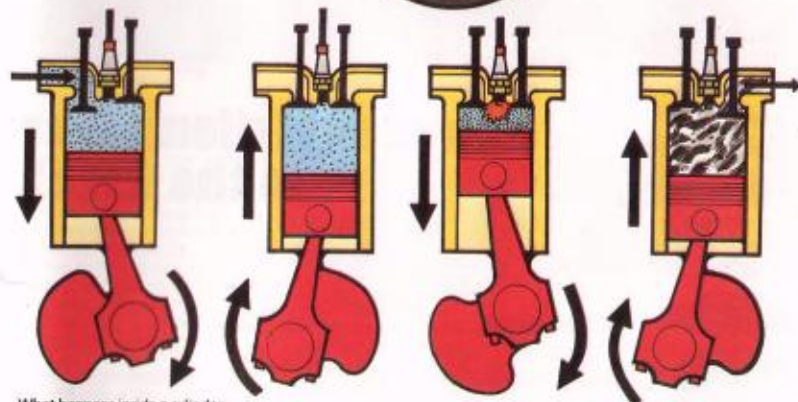
Switching on
The pistons inside the cylinders do the pushing. (Look for them in the large picture). When the driver switches on, petrol is pumped along a thin fuel pipe from the tank into the carburettor. Here it is squirted through a little hole which makes it into a fine mist or vapour. This vapour is mixed with air and goes into the top of each cylinder through a valve.

Explosions in the cylinders
Electricity from the battery jumps through the spark plug at the top of the cylinder and makes a spark. This lights the mixture of petrol and air and it explodes. The explosion pushes the piston down inside the cylinder and a connecting rod at the end of the piston pushes the crankshaft round. More explosions in the other cylinders keep the crankshaft turning.

Getting into gear
When the driver is ready to move, he uses the clutch and the gears to connect the turning crankshaft with the turning propeller shaft which runs along under the car to the back wheels. (It is inside that hump on the floor in the back of the car.) By a clever arrangement of cogs, called the differential, the turning propeller shaft makes the back axle go round. That turns the back wheels. When the back wheels turn, the car moves along.

Keeping the engine cool and quiet
The explosions in the cylinders make heat and fumes and noise. The heat in the engine is cooled down by water from the radiator which is pumped round the outside of the cylinders. The fumes are pushed out of the top of the cylinder through another valve. They go along the exhaust pipe, through the silencer (which muffles the noise) and out of the exhaust pipe at the back. The explosions in the engine happen very fast and the pistons go up and down about 100 times a second. To help them keep moving smoothly inside the cylinders, they need oil.

What an engine needs
So to start the car and keep it running smoothly, an engine needs petrol to make the vapour, electricity from the battery for the spark, oil to keep the pistons moving smoothly and water to keep it cool.



What happens inside a cylinder

- 1 Air and petrol vapour come through one valve into the top of the cylinder.
- 2 The piston squeezes the mixture into a little space at the top of the cylinder.
- 3 The spark from the sparking plug explodes the mixture and the piston is forced down.
- 4 The piston comes up again and pushes the fumes out of the other valve.

Activities

- 1 Look at a car and its engine with a grown-up who knows about cars. Where are the petrol, oil, and water put in? Can you find the pipe that takes water from the radiator to the engine? Can you see the tops of the spark plugs? (If you count them, you will know how many cylinders the engine has.)
- 2 Talk with the grown-up about the things you see under the bonnet. What happens if a car runs out of petrol or oil or water? How do you stop a car moving? How do you stop the engine?

How Much Petrol?



The amount of petrol a car uses is called its fuel consumption. On your program, fuel consumption is measured by showing how many kilometres the car will go on one litre of petrol (kilometres per litre), but many people still record fuel consumption in miles per gallon. People have begun to realise that the world's supply of oil (from which petrol is made) will not last for ever. And petrol is expensive. So cars which use less petrol and travel more kilometres to the litre have become very popular.



2.1 km Double-decker bus



4.1 km Lorry



6.4 km Rolls Royce Silver Shadow



8.1 km Porsche 944



16.7 km Cortina 1.6L



20.6 km Metro L



15.6 km 500cc motor bike



60.1 km 50cc moped

How many kilometres to the litre?

The bar chart on the right shows how the fuel consumption (kilometres per litre) of the average car is affected by its speed. Look at the highest bar. This shows that the best fuel consumption (most kilometres per litre) for this car is when its speed is kilometres per hour. The chart shows that, at this speed, the car should travel kilometres on one litre of petrol.



This chart shows you the fuel consumption of different vehicles. You can see how a big vehicle, or one with a very powerful engine, travels fewer kilometres on one litre of fuel than the smaller vehicles. But fuel consumption can be affected by other things, too. Stopping and starting the car a lot in heavy traffic means that the driver has to keep the car in low gear. This uses up a lot of petrol. Drivers who accelerate fast, 'roar' the engine and drive at high speeds use up more petrol than people who drive smoothly and steadily.



Activities

- 1 Can you work out the fuel consumption of the car you usually ride in? You will need to record how far the car goes and how much petrol it uses between two full tanks. Ask your family to help you.
- 2 Does your local garage sell petrol in gallons or in litres? What grades of petrol can you buy? (Grades are shown by stars.) What grade does the car you know best use? You could watch to see what grades drivers of other cars use. Ask your friends what grades their cars use. You could make a chart showing the star grades and the cars that use each grade.

The Roads of Britain

Think about the different sorts of roads you travel on - short journeys (to school, to the shops), and longer ones, for example when you go on holiday. Roads are very important for industry too: factories need to transport their goods all over the country.

So we need many kinds of roads. If you look at a map you can see how these different roads are shown.

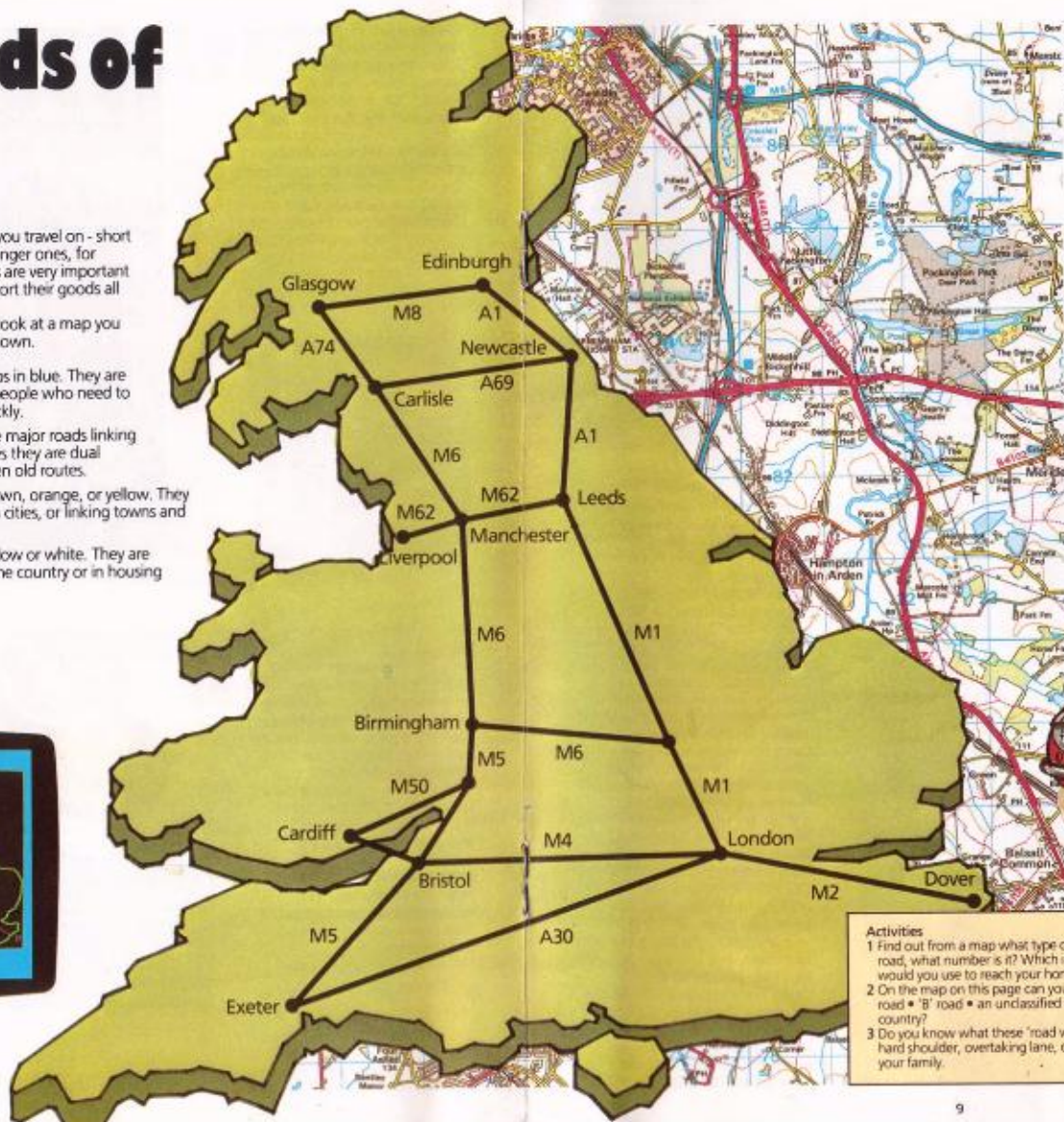
Motorways are marked on most maps in blue. They are wide modern roads for people who need to travel long distances quickly.

'A' roads are marked in red. They are major roads linking towns and cities; sometimes they are dual carriageways. They are often old routes.

'B' roads are marked on maps in brown, orange, or yellow. They are less important routes in cities, or linking towns and villages.

Unclassified roads are marked in yellow or white. They are smaller roads in the country or in housing areas of towns.

How the road network will appear on your screen.



Key to Symbols	
M6	Motorway
A452	Main road
B4102	Secondary road
	Road more than 4m wide
	Other road, drive or track
	Railway line
	Path
	River



- Activities**
- 1 Find out from a map what type of road your town is on. If it is an 'A' or 'B' road, what number is it? Which is your nearest motorway and which exit would you use to reach your home?
 - 2 On the map on this page you can find the following roads: Motorway • 'A' road • 'B' road • an unclassified road in a town • an unclassified road in the country?
 - 3 Do you know what these 'road words' mean: by-pass, dual carriageway, hard shoulder, overtaking lane, central reservation? Talk about them with your family.

Toad of Toad Hall

Far behind them they heard a faint warning hum, like the drone of a distant bee. Glancing back, they saw a small cloud of dust, with a dark centre of energy, advancing on them at incredible speed, while from out the dust a faint "Poop-poop!" wailed like an uneasy animal in pain. Hardly regarding it, they turned to resume their conversation, when in an instant (as it seemed) the peaceful scene was changed, and with a blast of wind and a whirl of sound that made them jump for the nearest ditch, it was on them! The "poop-poop" rang with a brazen shout in their ears, they had a moment's glimpse of an interior of glittering plate-glass and rich morocco, and the magnificent motor-car, immense breath-snatching, passionate, with its pilot tense and hugging his wheel, possessed all earth and air for the fraction

of a second, flung an enveloping cloud of dust that blinded and enwrapped them utterly, and then dwindled to a speck in the far distance, changed back into a droning bee once more. Toad sat straight down in the middle of the dusty road, his legs stretched out before him, and stared fixedly in the direction of the disappearing motor-car. He breathed short, his face wore a placid, satisfied expression, and at intervals he faintly murmured "Poop-poop!" The Rat shook him by the shoulder. "Are you coming to help us, Toad?" he demanded sternly. "Glorious, stirring sight!" murmured Toad, never offering to move. "The poetry of motion! The real way to travel! The only way to travel! Here to-day - in next week to-morrow!



Villages skipped, towns and cities jumped - always somebody else's horizon! O bliss! O poop-poop! O my! O my!" "O stop being an ass, Toad!" cried the Mole despairingly. "And to think I never knew!" went on the Toad in a dreamy monotone. "All those wasted years that lie behind me, I never knew, never even dreamt! But now - but now that I know, now that I fully realize! O what a flowery track lies spread before me, henceforth! What dust-clouds shall spring up behind me as I speed on my reckless way!" "What are we to do with him?" asked the Mole of the Water Rat. "Nothing at all," replied the Rat firmly. "Because there is really nothing to be done. You see, I know him from old. He is now possessed. He has got a new craze, and it always takes him that way, in its first stage. He'll continue like that for days now, like an animal walking in a happy dream, quite useless for all practical purposes. Never mind him. Let's go and see what there is



to be done about the cart." A careful inspection showed them that, even if they succeeded in righting it by themselves, the cart would travel no longer. The axles were in a hopeless state, and the missing wheel was shattered into pieces.

Toad buys several expensive cars and crashes them. Rat and Mole, with their friend Badger, decide that they will try to cure him of his car craze. They keep him shut up in his bedroom but he escapes and goes off for a meal in an inn...

Toad was about half-way through his meal when an only too familiar sound, approaching down the street, made him start and fall a-trembling all over. The poop-poop! drew nearer and nearer, the car could be heard to turn into the inn-yard and come to a stop, and Toad had to hold on to the leg of the table to conceal his overmastering emotion. Presently the party entered the coffee-room, hungry, talkative and gay, voluble on their experiences of the morning and the merits of the chariot that had brought them

along so well. Toad listened eagerly, all ears, for a time; at last he could stand it no longer. He slipped out of the room quietly, paid his bill at the bar, and as soon as he got outside sauntered round quietly to the inn-yard. "There cannot be any harm," he said to himself, "in my only just looking at it!"

The car stood in the middle of the yard, quite unattended, the stable-helps and other hangers-on being all at their dinner. Toad walked slowly round it, inspecting, criticizing, musing deeply. "I wonder," he said to himself presently, "I wonder if this sort of car starts easily?" Next moment, hardly knowing how it came about, he found he had hold of the handle and was turning it. As the familiar sound broke forth, the old passion seized on Toad and completely mastered him, body and soul. As if in a dream, he pulled the lever and swung the car round the yard and out through the archway; and, as if in a dream, all sense of right and wrong, all fear of obvious consequences, seemed

temporarily suspended. He increased his pace, and as the car devoured the street and leapt forth on the high road through the open country, he was only conscious that he was Toad once more, Toad at his best and highest, Toad the terror, the traffic-queller, the Lord of the lone trail, before whom all must give way or be smitten into nothingness and everlasting night. He chanted as he flew, and the car responded with sonorous drone; the miles were eaten up under him as he sped he knew not whither, fulfilling his instincts, living his hour, reckless of what might come to him.

Toad has another crash and is sentenced to 20 years in prison! Read the rest of his story in *The Wind in the Willows* by Kenneth Grahame.



Games for One or More People

1 Careful driver — level one

See if you can find out how to drive the four vehicles as efficiently as possible.

Choose Edinburgh as your hometown, and select the small car. Travel from Edinburgh to Newcastle, at a constant speed.

When you reach Newcastle, look at your progress chart and record the distance travelled and the litres of fuel used.

Start the program again, and repeat the same journey at a different speed.

Try the same experiment with all the other vehicles, and see which you find uses the least fuel over the same distance.

You can calculate the fuel consumption for each vehicle at each speed as follows:

$$\text{Fuel Consumption (km/l)} = \frac{\text{Distance travelled (km)}}{\text{Fuel used (l)}}$$

Compare your figures for fuel consumption with those given with the program which you can see by pressing 5.



2. Wacky rally — level two

See who can visit all of the cities marked on the map in the best time. Remember to plan your route very carefully.

As you visit each city, write down its name on a piece of paper. When you have been to all the cities, record your time from the progress chart. Start the program again and see if your friend can beat your time!



Mystery tour — level two

Imagine that you are going on a two day holiday. Here is a list of events happening in Britain over the next two days. See if you can plan a holiday tour to visit as many of these events as you can.

Choose the events which you would like to attend and decide where you will start your tour. You will need to stay for at least two hours at each event to make the journey worthwhile. You can start the tour at seven o'clock but you must stop to eat between twelve and one, and between five and six. Remember that the program uses the twenty-four hour clock. Because the twenty-four hour clock does not start counting from 'one' in the afternoon, all afternoon times are twelve hours greater than normal. 5 o'clock p.m. is 17.00 (seventeen hundred hours).

To help you plan your itinerary, you should use the table of distances.

Use this formula to work out how fast you will have to travel between towns if you are going to keep to your planned tour.

$$\text{Speed (km/h)} = \frac{\text{Distance (km)}}{\text{Time (h)}}$$

For example, if you had planned to leave Dover at 16.00 hours but needed to be in Birmingham by 19.00 hours then:

Travelling time is $19.16 - 16.00 = 3$ hours
 distance (from the table) is 270 km
 Speed = $\frac{270 \text{ km}}{3 \text{ hours}} = 90 \text{ km/h}$

You will have to travel at 90 km/h to leave two hours at the concert before the end of the day. You may find that you would have to travel faster than the speed limit to get to an event on time! You will then have to try and change your route or maybe your itinerary.

Good luck! Have a nice holiday but don't forget to look out for hazards which may spoil all your plans.

TABLE OF DISTANCES

KILOMETRES	BIRMINGHAM	BRISTOL	CARDIFF	CARLISLE	DOVER	EDINBURGH	EXETER	GLASGOW	LEEDS	LIVERPOOL	MANCHESTER	NEWCASTLE UPON TYNE	LONDON
150	318	468	443	270	298	370	588	70	749	557	161	12	75
75	75	50	393	379	580	197	546	11	86	286	211	404	184
184	234	309	246	454	443	456	399	259	270	120	128	278	253
339	489	464	91	531	176	611	244	414	347	147	267	217	270
184	256	474	114	593	389	661	373	70	270	340	284	317	

KILOMETRES

Day	Morning 7.00-12.00	Afternoon 13.00-17.00	Evening 18.00-21.00
Exeter			Cider Festival
Bristol	Visit SS Great Britain		
Dover		Visit to Dover Castle	
London	Visit to Westminster Abbey		Pantomime
Cardiff	Eisteddfod		
Birmingham			Pop Concert
Day 2			
Manchester		Model Exhibition	
Leeds		Cricket Match	
Liverpool			Service at Cathedral
Newcastle		Folk Music	
Carlisle	Visit to the Lakes		
Glasgow		Highland Games	
Edinburgh			Festival



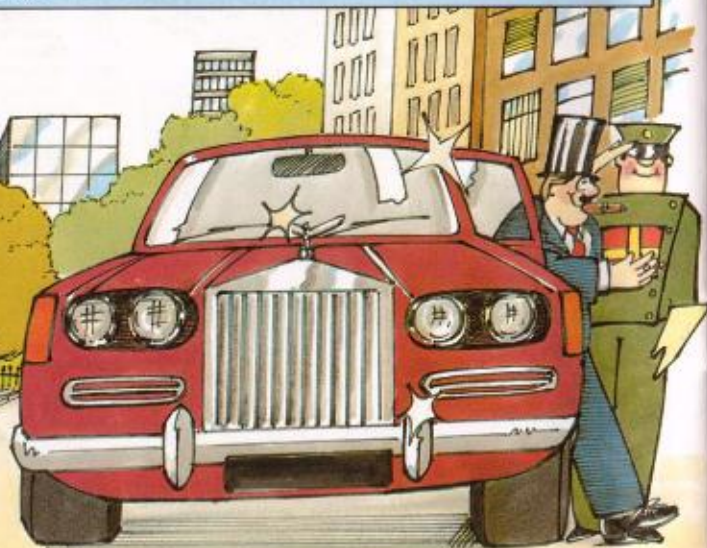
Running the Delivery Service

Running the Delivery Service

There are many things to consider when you are trying to run your Delivery service. You make money by travelling around Britain and delivering items. See if you can break even and try not to go bankrupt. How well you are doing is recorded on the progress chart. Coins represent ten pounds, bags of coins one hundred pounds and gold bars one thousand pounds. Money in the blue square is money that is yours. Money in the yellow square is money that you owe. Here are a few tips to help you.

Making money

- 1 The fee for delivering some contracts is larger than for others. However, the more valuable contracts need to be delivered quickly.
- 2 An item for delivery may be collected up to twenty-four hours before the collection time. If you deliver it very close to the delivery time, you will receive a large bonus.
- 3 Plan your journeys carefully. You can save yourself a lot of petrol by carrying more than one contract at a time. You can choose up to six contracts at one time.
- 4 Choose your vehicle carefully. The small vehicles travel more quickly and use less fuel than the larger vehicles. But they do not carry as much.
- 5 Whenever the clock reaches 19.00 hrs you must stop where you are for the night. If it is Friday, you will stay where you are for the whole weekend. Each overnight stop costs you money unless you are in your hometown. If you are in your hometown for the night then you will not have to pay for accommodation.



Losing Money

- 1 If you fail to collect an item on time, you will pay a penalty. Be careful not to choose so many contracts that your vehicle becomes overloaded when you try to collect items. If your vehicle does become overloaded you must deliver some of the items you are carrying before you can collect any more.
- 2 If you have collected an item, but deliver it late you will receive your fee but also pay a large penalty. If you are over a day late you will lose the contract and pay a large penalty.
- 3 You must pay for the hire of your vehicle every day. Whenever you change your vehicle you also have to fill up with petrol.
- 4 Each time you fill up with petrol it will cost you money. The larger the fuel tank capacity of your vehicle the more it will cost you to refuel.