Mission 8: Transport
What is Transport?

Transport is the way that people and the stuff they need are carried from one place to another. Transport has changed a lot over time.

Two hundred years ago, all transport was carried out by humans, animals or by using natural energy like the wind. In 1750 a stagecoach could travel just five and a half miles an hour.

Wind power carried ships across the sea, transporting people to explore foreign countries and for the transport of precious material like spices, silk and gold.

Steam engines were invented at the end of the 1700s. These engines could power machines to transport things. Steamships and barges enabled transport by sea and along rivers and canals. The first steam train ran from Manchester to Liverpool in 1830.

Machines could transport people and things further and faster than ever before. New engines have been developed over time: electric engines, internal combustion engines, ... Today, there are fighter jets that can travel over 10,000 miles per hour and space shuttles that can travel to other planets.

There are two types of transport: the transport of people and the transport of material, called freight. People travel by bus, train, car and aeroplane. Freight is transported by trucks, ships and air freight. Today, transport is a huge industry all over the world and uses enormous amounts of raw materials and Energy.

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## Transport Quiz

Test your memory with the Transport Quiz and see how high your score is!

### Transport Quiz (one point for each right answer)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>What is the word used to describe material that is transported?</td>
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<tr>
<td>How many years ago was all transport carried out by human, animal or wind power?</td>
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<tr>
<td>How fast could a stage coach travel in 1750?</td>
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<tr>
<td>How fast can fighter jets travel today?</td>
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<tr>
<td>Has transport changed a lot over the last 200 years?</td>
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<tr>
<td>Name 2 different types of engines that have been invented.</td>
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<td>Name 2 precious materials that were transported using sailing ships.</td>
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<tr>
<td>You could travel from _________ to _________ by train in 1830.</td>
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<tr>
<td>Name 3 types of vehicle that transport people nowadays.</td>
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<tr>
<td>Transport uses lots of E________ .</td>
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Add up your correct answers and enter your score

Find a picture of an aeroplane in a book or magazine and draw it in the box below.

More people are travelling by air than ever before, making air travel the fastest growing area in transport!
Transport and Energy

Transport uses lots of energy. Energy is the power to do work and the energy that makes vehicles work comes from FOSSIL FUELS. Fossil fuels include coal, oil and gas. Petrol and diesel are made from oil. One day, fossil fuels will run out.

Hey Nathan, look at the pie chart. Wow! Transport is the second biggest use of energy we have! It uses the same as industrial, services and buildings all put together! That's our homes, schools, offices and shops!

![Energy Users Pie Chart](chart.png)

(Figures from: The Carbon Trust, 2002)

The energy used by transport has nearly doubled since 1970. There are a number of reasons for this.

- Countries are buying more goods from other countries. These goods then have to be transported over, so people can buy them.
- More people are travelling abroad for holidays than ever before. This means there has been a big increase in air transport.
- There has been a huge increase in the number of cars on our roads. Most households have two cars.

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Can you help me complete the Energy Users pie chart?

We need to:

- Copy the information from the pie chart you have looked at.
- Use your own choice of colour but, remember to use 4 different colours and match the colour for each user, like Domestic, to the colour of the correct slice of pie.
- Write the percentages in the correct places.

Energy Users

(Figures from: The Carbon Trust, 2002)
Most of us do not know how much energy we are using and how much pollution we are making when we drive our cars. Yet, the way we shop, live, work and travel is affecting the health and future of our planet.

Transport is now using 6.4 million tonnes more oil than it used to. Fossil fuels are non-renewable resources and will run out. The faster we use them, the sooner they will be gone.

Transport needs to change; to save energy so that fossil fuels last as long as possible and to prevent pollution, protecting the environment. If we want to keep motoring after the fossil fuels are all gone, we need to invent vehicles that use different kinds of energy instead.
Energy Efficiency and Clean Cars

The word **Efficient** means that nothing is wasted.

- Efficient cars burn less fuel
- Burning less fuel saves money.
- Burning less fuel saves fossil fuels.
- Efficient cars produce less carbon dioxide, which reduces the risk of global warming.

There are some cool new cars being developed, cars that are much more efficient.

**Hybrid Vehicles**

Hybrids have a normal petrol engine and a battery. Both the engine and the battery can power the car and the car switches from one to the other. When the hybrid car is in heavy traffic, where it is stopping and starting, the car is powered by the battery. This reduces the amount of petrol used, and cuts down pollution.

Hybrid cars are more expensive, but they are cheaper to run as they do not need as much fuel.

Below you can see two hybrid cars

- **Toyota Prius**
- **Lexus RX400h**

Hybrid cars look exactly the same as normal cars!
Battery/Electric Cars

Battery/electric cars, are vehicles which are only powered by electricity stored in a battery. They do not use petrol or diesel. The batteries are recharged by plugging them into the mains electricity. A battery car can travel up to 50 miles per hour, and they go about 50 miles before they need recharged. It takes 6 hours to recharge the batteries.

Advantages
- Battery cars do not produce any pollution.
- They are the same price as other small cars, some are even cheaper.
- Battery cars are cheaper to run.
- They only use a quarter of the energy that a normal engine uses, they are very efficient.
- If renewable energy is used to produce the electricity, it will further cut down on the carbon dioxide being made.

Disadvantages
- Battery cars cannot travel as far or as fast as other cars.
- There are only 6 recharging points for battery cars in the UK.
- Better batteries need to be developed. They need to be lighter, cheaper, able to hold more energy and last longer.

G-Wiz Battery Electric Car!
Perfect for city motoring. It can be yours for £7,000!
When people buy a car they choose one that they like and that will suit their lifestyle. Things like where they live, how far they have to travel to work, how many children they have, how much they care about the environment etc... will help them decide what car to buy. Imagine you are buying a car and decide between a hybrid and a battery/electric car. You might want to do a bit of research to find out more facts and fill in the table.

I don't need a car, I just fly everywhere!

<table>
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<tr>
<th>Car Characteristics</th>
<th>Hybrid</th>
<th>Battery/Electric</th>
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<tbody>
<tr>
<td>Cost</td>
<td></td>
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<tr>
<td>Looks</td>
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<tr>
<td>Speed</td>
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<tr>
<td>Where you live town/country</td>
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<tr>
<td>Environmental benefits</td>
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You could use the work you have done for a class debate. Divide the class in half and each half argue in favour of a different Clean Car.
Fuel Cells

Fuel Cells use hydrogen to make electricity. This electricity can then be used to power an engine. Fuel cells do not cause any pollution.

**Advantages**

- There is a plentiful supply of hydrogen in the environment.
- Fuel cells do not make any pollution, which means no carbon dioxide.

**Disadvantages**

- Making the hydrogen fuel is expensive.
- More research and development needs to be done to reduce the cost of making these new cars and to put all the technology in place.
- Fuel Cell vehicles probably won’t be available for everyone to buy until the year 2020.

The two biggest carmakers in the world are going to work together to develop fuel cells. This means that hydrogen powered cars will be available sooner!

In London fuel cell buses are used. Peugeot have launched a quad that is powered by a fuel cell.
Alternative Fuels

There are other fuels available now that can be used instead of petrol or diesel. There are alternative fossil fuels and biofuels that are made from plants.

**Alternative Fossil Fuels**

**Liquefied Petroleum Gas (LPG)** is a fossil fuel, made from crude oil. Bi-fuel cars can burn petrol and LPG. When the engine is turned on it uses petrol, but once the engine has heated up, the fuel automatically changes to LPG. LPG is up to 25% cheaper than petrol or diesel and also releases less carbon dioxide into the air.

**Natural Gas** vehicles burn methane gas. A lot of methane gas is needed to provide the energy needed to power the car. This means that it is only suitable for large vehicles with big fuel tanks like trucks and buses. Methane is much cleaner and produces a lot less nasty gases, less carbon dioxide and methane engines are quieter.

**Biofuels**

**Biodiesel** is like ordinary diesel but is made from oily plants like rapeseed, sunflower and soy beans. It can also be made from waste vegetable oil. Biodiesel is renewable energy and will not run out. Biodiesel is carbon neutral, this means when it is burned the carbon dioxide released is the same amount of carbon dioxide that went into the plants as they grew in the first place. Biodiesel is more expensive.

**Alcohol** has been used as a fuel in Brazil for 20 years. Alcohol is made from plant sugar. Again, this is a renewable fuel which is carbon neutral and produces less carbon dioxide than fossil fuels.

If all of the suitable land in the UK was used to grow fuel crops, biodiesel could supply 10% of our energy needs. If waste from forestry, agriculture and household rubbish was used even more energy could be provided.
Changing Lifestyles

Today lots of homes have two cars. We have become very dependent on cars, and often don't walk or cycle anywhere, or use public transport.

Problems caused by car dependency:-

- All the cars cause a lot of pollution, spewing out carbon dioxide and other harmful gases into the air.
- The more car journeys people make the more fuel and energy they are using. This is using up fossil fuels and costing the drivers a lot of money!
- Lots of cars on the road make a lot of noise and this is a type of pollution too.
- Lots of cars on the road at the same time, for example, when everyone is going to work and bringing their kids to school, results in traffic jams.
- People who spend a lot of time behind the wheel are often stressed out and do not get enough exercise. These people get sick more often.

Alternative forms of Transport

By using the alternatives above, we can cut down on the amount of fuel used, and reduce the amount of pollution in our air. Also if you walk or cycle instead of taking the car, you'll be exercising!

During rush hour, 60% of cars have only one person in them! Pollution could be reduced and fuel/energy could be saved if people shared cars, and took it in turns to drive.

If 50 people who normally drive to work alone, were all to get the bus or train instead, it would mean there would be 50 less cars on the road.
Can you find all of these words in the grid above.

ACIDRAIN
AEROPLANE
ASTHMA
BICYCLE
BIOFUEL
BUS
CAR
CARBONDIOXIDE
CARBONMONOXIDE
COAL
DEPENDENCY
DIESEL
EFFICIENT
HYBRID
LEGISLATION
LORRY
OIL
SHIP
TRANSPORT

ELECTRIC
EMISSIONS
ENERGY
ENVIRONMENT
FOSSILSFUELS
FREIGHT
FUELCELL
GLOBALWARMING
HYBRID
PARTICULATEFILTER
PETROL
POLLUTION
SHARING
TAILPIPE
TRAIN
<table>
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<th>Keywords and definitions</th>
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<tr>
<td><strong>Acid Rain</strong></td>
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<td><strong>Asthma</strong></td>
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<tr>
<td><strong>Biofuels</strong></td>
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<tr>
<td><strong>Car Sharing</strong></td>
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<td><strong>Car Dependency</strong></td>
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<td><strong>Carbon dioxide</strong></td>
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<td><strong>Carbon monoxide</strong></td>
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<td><strong>Diesel</strong></td>
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<td><strong>Efficient</strong></td>
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<td><strong>Electric vehicles</strong></td>
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<td><strong>Emissions</strong></td>
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<td><strong>Energy</strong></td>
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<tr>
<td><strong>Fossil Fuels</strong></td>
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<td><strong>Freight</strong></td>
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<td><strong>Fuel Cell</strong></td>
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<td><strong>Global Warming</strong></td>
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<td><strong>Nitrous Oxides</strong></td>
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<td><strong>Oil</strong></td>
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<td><strong>Particulate Filter</strong></td>
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<tr>
<td><strong>Petrol</strong></td>
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<tr>
<td><strong>Pollution</strong></td>
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<td><strong>Sulphur dioxide</strong></td>
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<td><strong>Tailpipe</strong></td>
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