Fun Size: Science, Technology and Reading Teacher notes

Introduction
Excerpt from the Science, Technology and Reading (STAR*) publication from ASE, which uses creative writing to stimulate debate.

Running the activity
Teacher notes from Star* are included in the pdf files

Safety
Not applicable.

More ideas
See STAR* notes.

Learning outcomes
See STAR* notes.

Where the activity fits in
Friction, forces and lubrication topics.

Skills
The STAR* notes refer to relevant science, literacy and numeracy skill development.

Acknowledgements
STAR* published by ASE.
Sponsored by ESSO, Royal Society for Chemistry, Institute of Physics and the Design Council.
ISBN 0 86357 315 0

Granma's Hands

My Granma's 72
She says she's getting old.
My Granma's 72
She says her hands are cold.

My Granma stands at the bus-stop
in all kinds of weather
My Granma stands at the bus-stop
rubbing her hands together.

'I always rub me hands,' she says
'when I'm running from pillar to post
'I always rub me hands,' she says
'ohh, they're warm as toast.'

Related poems:

Engine Oil
Lubricate the Joints

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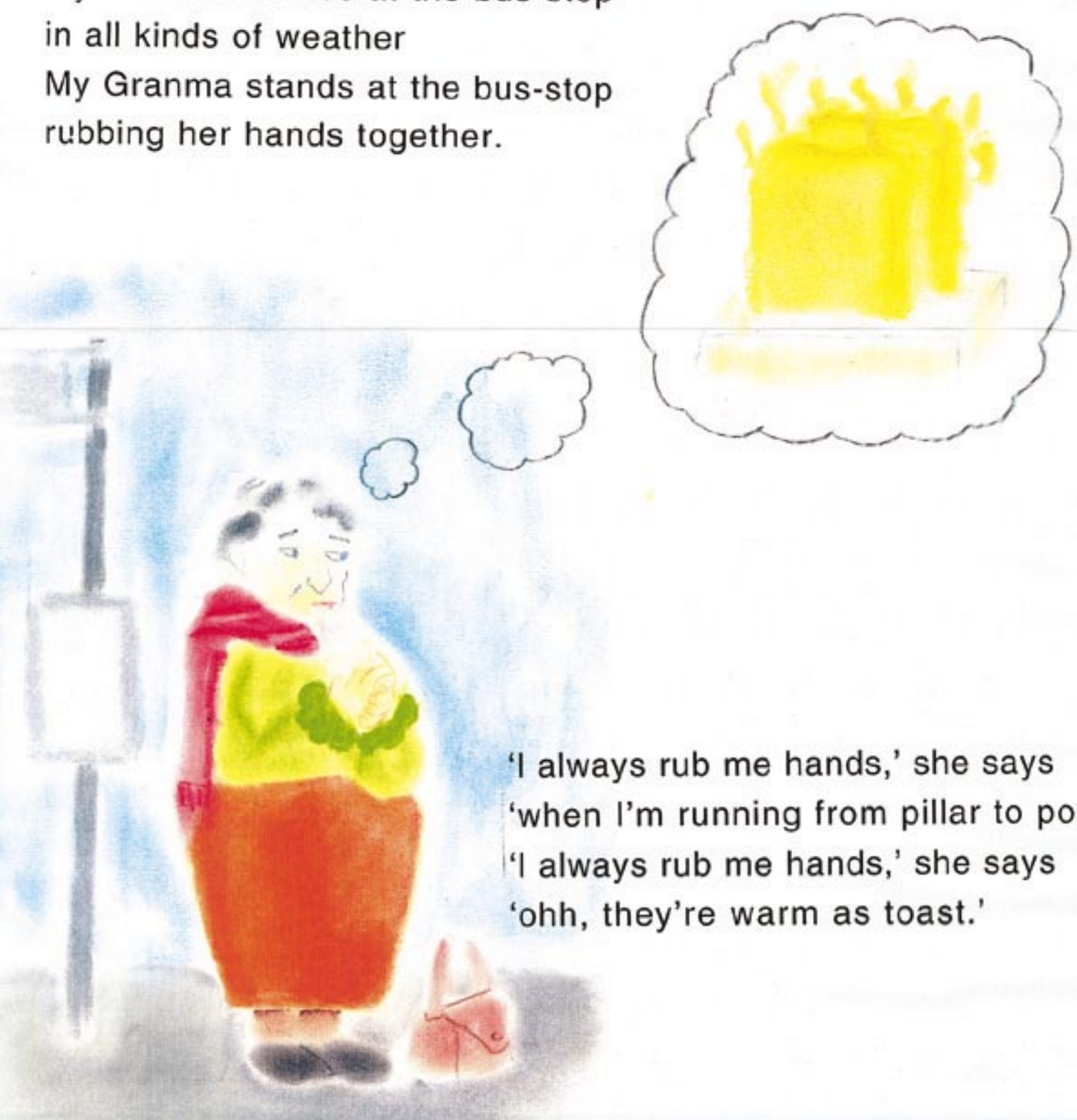


'I always rub me hands,' she says
'when I'm running from pillar to post,
'I always rub me hands,' she says
'ohh, they're warm as toast.'

"Granma's Hands"

Discussion Points

- How many of you have waited at bus stops in the cold?
- What kind of things do you do to keep warm?
- What does grandma do to keep warm?
- First, rub your hands together slowly, then rub them together quickly.
- What happens? What can you feel? What can you see?
- What do you think makes your hands feel hot?
- What can you do to make them even warmer?
- Can you think of any other examples where two surfaces rubbing together creates heat, such as car tyres at the end of a journey?
- What different ways do people use to keep warm in winter?

Science Background

- Friction is the force created by two surfaces moving against each other.
- When two objects are rubbed against each other, heat is produced as a by-product. This is because energy is being used to overcome the friction and some of this energy is released as heat.
- Friction is a force that opposes movement but can either ease or hamper the movement of objects and materials.
- Without friction everyday movements become impossible, for example: friction occurs when writing with a pen or pencil on a piece of paper; a rolling ball slows down or stops because of friction.
- The surface does not have to be a solid. Friction also occurs through movement in both liquids and gases.
- All solids have tiny irregularities that catch and hinder movement. If the surface is lubricated these irregularities are easier to resist and friction is reduced.

Key Ideas

- There is a force between two moving surfaces in contact called friction. The force may or may not be useful.
- Different surfaces cause different amounts of friction to a moving object.
- Lubricants reduce the effects of friction and allow surfaces to move more freely.

Science Skills

Children should be able to :

- turn suggestions into ideas;
- understand the use of control experiments;
- investigate, predict and conduct a fair test;
- choose and use apparatus and equipment accurately;
- draw conclusions;
- work with others.

Key Activities

Observe the effects of friction on balls, bean bags, or quoits by watching their movement across different surfaces. Can children identify the different speeds the objects travel? Do they roll or skid? Brainstorm examples from everyday experience. Perhaps focus on a fairground or playground where friction is either helpful or can cause problems.

Conduct a rubbing test. Rub a block of wood covered with material against different surfaces to test which surfaces create holes in a given material. This is a simple measure of the friction created by the two surfaces. Alternatively, rub a variety of materials on the same surface to investigate which is the safest material to wear in a playground to protect against friction burns.

Using a slope, slide, marble run, or guttering, explore how the speed of an object can be changed as it travels down a helter skelter by changing the helter skelter's surface. The surface can be made: wet, dry, oily, sandy, smooth or rough. The children should be encouraged to keep the object and the slope the same.

Using different lubricants, for example: vaseline, washing-up liquid, polish, baby oil ,vegetable oil, or water (plastic gloves should be used when applying lubricants) – use a Newton-meter or stretch an elastic band to measure the force needed to move an object across a given surface. To obtain different readings make sure the surface is not too smooth. Compare the results against a non-lubricated surface as a control.

Explore other methods of reducing friction including rollers, marbles or wheels.

Safety : Be aware of the hazards when handling lubricants. Wear safety goggles.
See ASE publication *Be Safe!* for information on all aspects of safety in school science.

Numeracy Skills

Children should be able to :

- measure using a Newton-meter;
- use a stopwatch accurately;
- take repeated readings;
- calculate mean, mode and median
- record results on charts or tables.

Literacy Skills

Children should be able to :

- understand how to use both rhyming and non-rhyming words;
- understand the use of direct and reported speech;
- write a verse in the style of the poem.

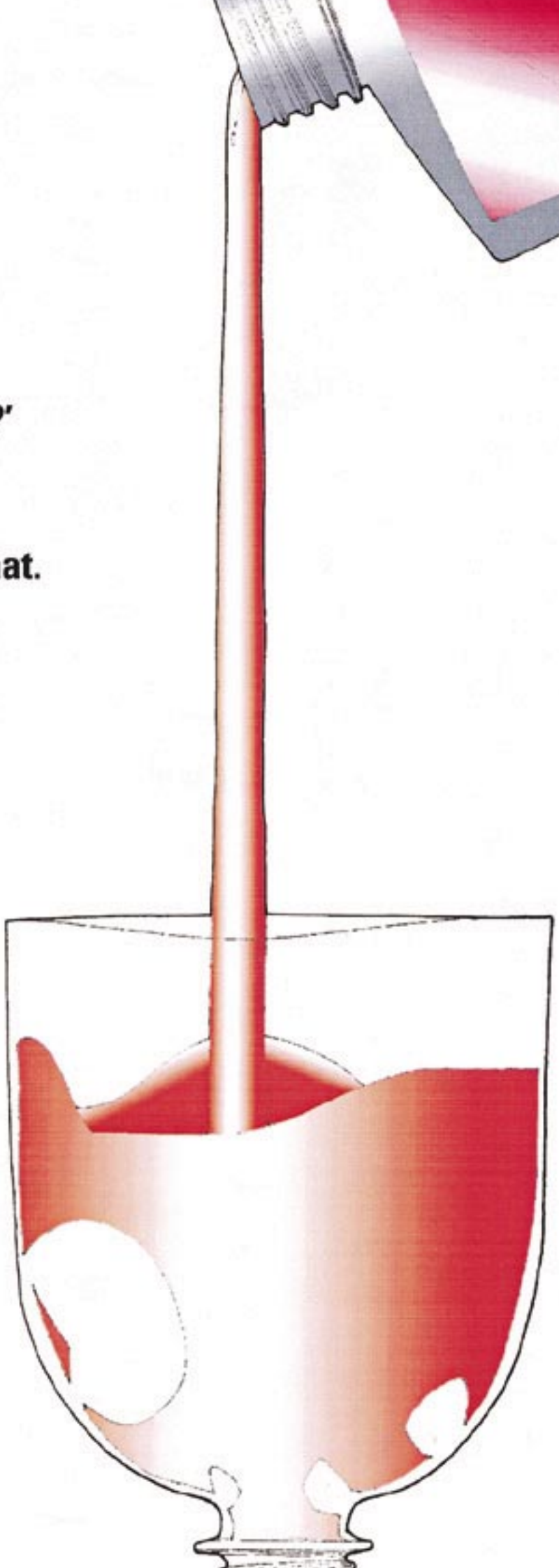
Engine Oil

My dad said to his friend
'I can't find my funnel.
Can I borrow yours?'
'Funnel?
What d'you need a funnel for?'
'For the oil.
To put the oil in the car.'
'You don't need a funnel for that.
I'll show you.'

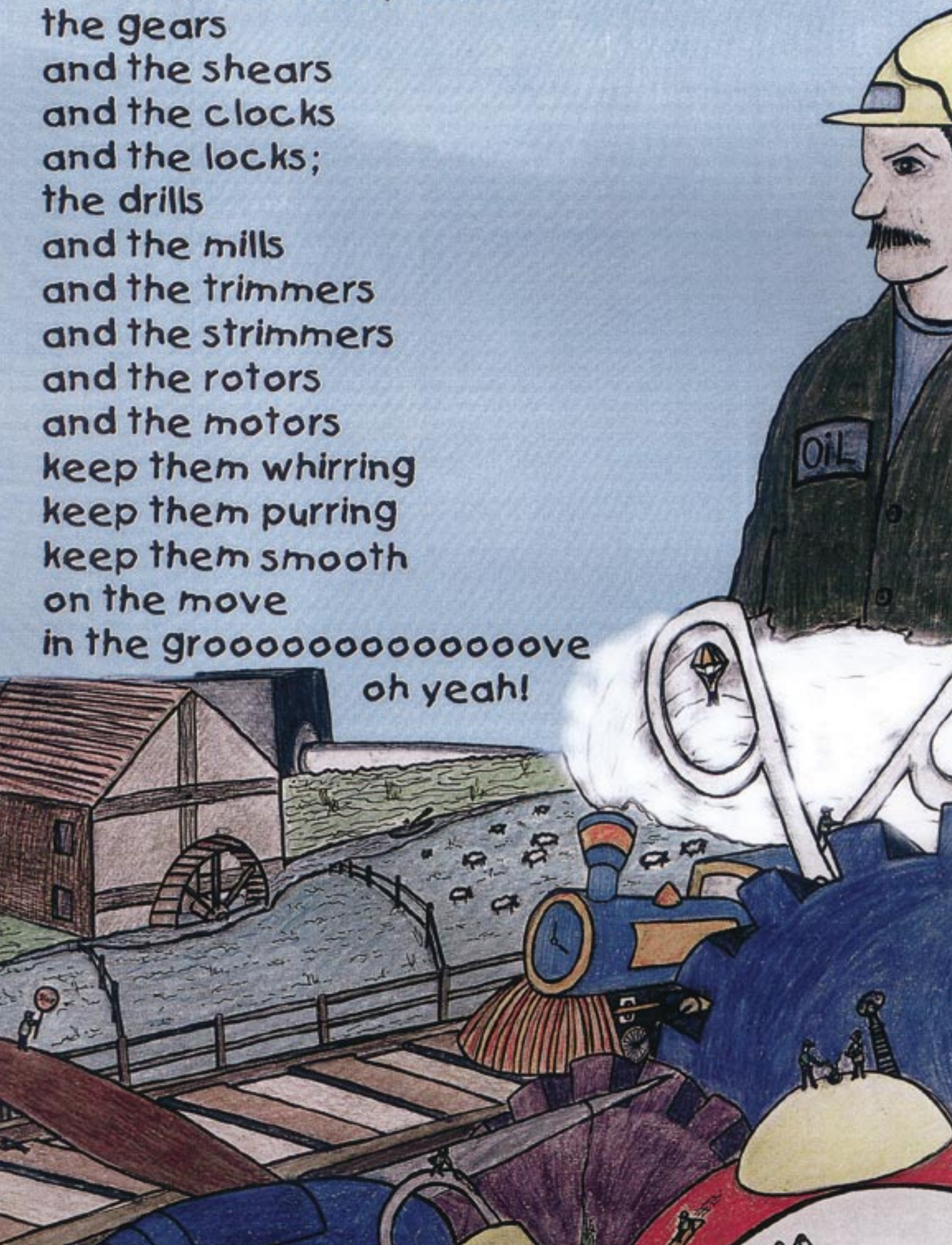
He grabbed a plastic bottle
and cut the bottom off it.

'There's your funnel.'

My dad
put the open top of the bottle
down into the hole
for the oil
and the thick yellow syrup
globbed and glooped
through the bottle
into the engine
like it knew the way there
from long ago.



Lubricate the joints
and the railtrack points
the gears
and the shears
and the clocks
and the locks;
the drills
and the mills
and the trimmers
and the strimmers
and the rotors
and the motors
keep them whirring
keep them purring
keep them smooth
on the move
in the groooooooooooooove
oh yeah!



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More ideas
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Learning outcomes
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Where the activity fits in
KS3 ecology, pollution and environmental chemistry topics.

Skills
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By Pass

All the people in the town said:
we want a by-pass.
Send the road
round the town
not right through the middle

Our children are being
knocked by the traffic:
people are getting asthma,
the buildings are falling down.

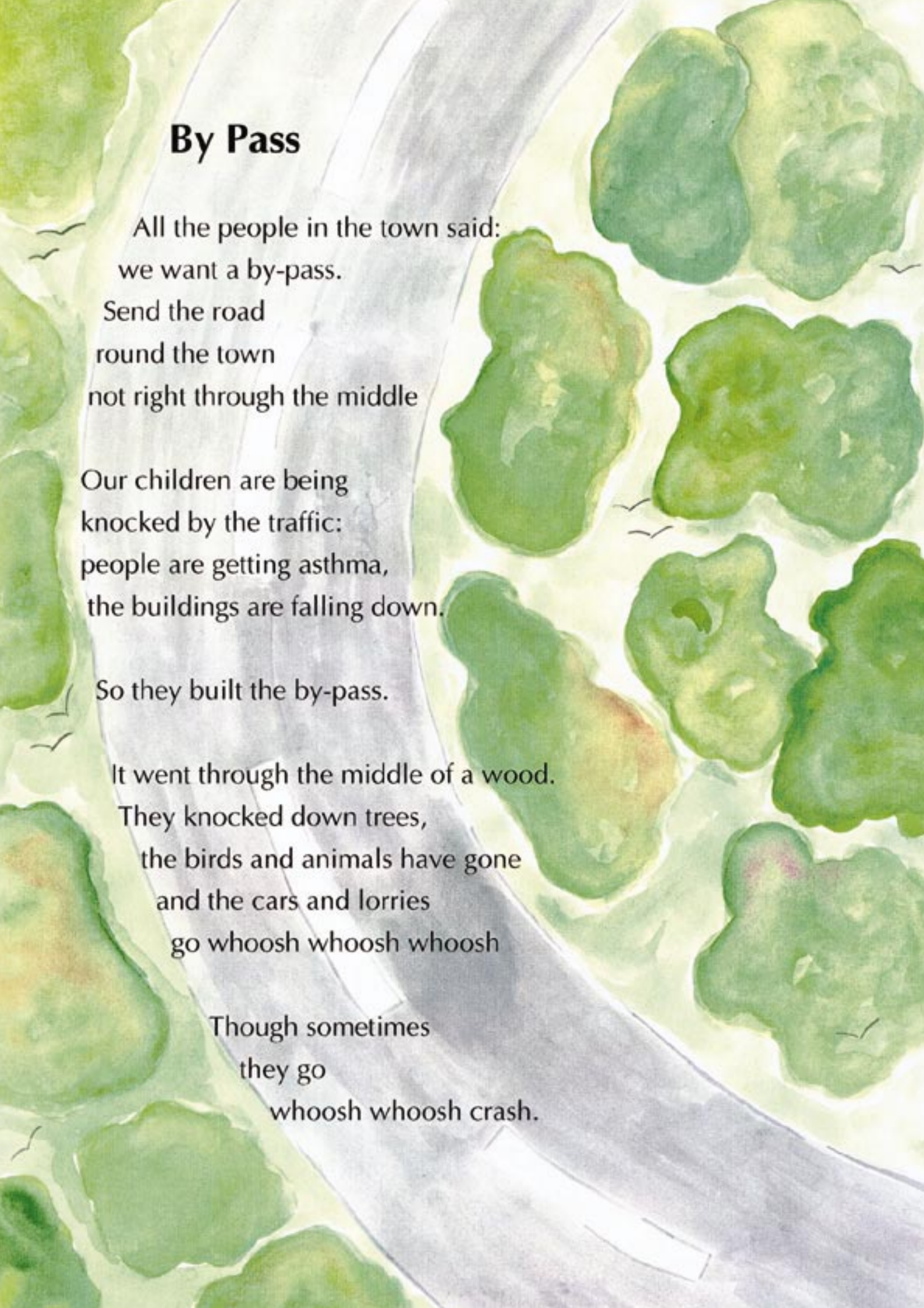
So they built the by-pass.

It went through the middle of a wood.
They knocked down trees,
the birds and animals have gone
and the cars and lorries
go whoosh whoosh whoosh

Though sometimes
they go
whoosh whoosh crash

Related poems:

Dirty T-shirt
How Humans Out Died



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"By Pass"

Discussion Points

- What is a bypass?
- Do you know of a bypass? Where is it? Why was it built?
- What changes took place because the bypass was built?
- Who decides to build a bypass?
- What are the good and bad things about a bypass?
- Where do you think the birds and animals go when a bypass is built?

Science Background

- When deciding whether a bypass should be built there are usually two sides to the argument. People in many areas of the country are in favour of a bypass, usually because of traffic problems such as the volume of cars and large lorries going through a small village or town, and noise and other pollution issues relating to safety of residents.
- In terms of pollution, road traffic contributes the following to the atmosphere: nitrogen oxides; benzene – which plays an important role in smog; carbon monoxide – which, as a gas, deprives the body of oxygen and can cause headaches; sulphur dioxide – which can cause tightening of the airways and aggravate asthmatics and people suffering from bronchitis; dust particles – which are emitted as part of black smoke from vehicles and are associated with heart and lung diseases.
- Linked to pollution is public health; there are approximately three million asthmatics around the country and it is known that pollutants from road traffic can aggravate and trigger asthma attacks.
- However on the other side of the argument there may be people who consider the environmental impact too devastating to warrant this type of construction. Many people are concerned about losing ecosystems, areas of special scientific interest (SSIs), plants and animals, as well as losing green belt land and land which is considered beautiful. Traffic can have a direct and indirect effect on wildlife. Rabbits, foxes, pheasants and hedgehogs (as many as 100,000) and amphibians, as well as badgers (approximately 47,000) are killed by vehicles on the roads. When a bypass is built, land which housed a range of habitats for plants and animals disappears.

Key Ideas

- Pros and cons of environmental improvements – damage to ecosystems versus other issues such as public health, the need to reduce traffic accidents in towns etc.
- Air pollution is caused by human activity and causes damage to both the environment and its inhabitants.

Science Skills

Children should be able to :

- choose and use appropriate apparatus, for example, filter papers, funnels and correct sized containers;
- decide what they need to know and plan an experiment to find the answers;
- understand the purpose of a control experiment;
- collect and evaluate evidence from various sources;
- work with others.

Key Activities

Prepare laminated cards, plastic sheeting or glass slides covered with double sided sticky tape or Vaseline and hang them in areas of the school grounds or the near vicinity. Children could predict which will show high and low levels of pollution, for example: a car park, the road or the garden. Leave for one or two days and look at the deposits with a magnifying glass. What do their results tell them? Children could take one home and compare the results in school. The following question could be set as an investigation. If a wet t-shirt was left to dry in or around your school, where would it get most dirty?

A teacher demonstration can be set up to show the impact of sulphur dioxide on plants.

1 Crush a Camden Tablet (obtainable from chemists)
2 Add two tablespoons of lemon juice in a glass jar.
3 Take two pots of cress.
4 Put one pot of cress and the jar in a plastic bag and fasten so the bag is sealed.
5 Put the second pot of cress in a sealed jar.
6 Observe the effects on the cress.

The gas given off by the Camden Tablet is sulphur dioxide and turns the cress yellow. Make a daily diary for a week.

Sample evergreen leaves, such as holly of the same age (count rings on the stem) from different locations. Wipe the leaves with absorbent white paper and compare the deposits. What explanation can be given for the findings? Ensure the place the leaf is taken from is recorded.

Ask the children to collect rainwater in a bottle with a filter paper and funnel placed in the top. Do the same by pouring the same amount of tap water through a filter. Compare any deposits with a magnifying glass.

They could also grow cress with distilled water and also with water and vinegar mixed in different proportions to see the effect on the cress. This simulates acid rain.

Either as a demonstration or as a supervised activity, burn small samples of safe pre-tested material to observe and compare the amount of smoke given off (wear goggles). Relate this to the impact on the environment of much larger scale burning.

Observe the deposits left on an inverted spoon held over a burning candle flame; or use filter paper or cotton wool placed in the far end of a jar over a burning candle to collect deposits and observe them.

Safety : Wear safety goggles during burning experiments.
See ASE publication *Be Safe!* for information on all aspects of safety in school science.

Numeracy Skills

Children should be able to :

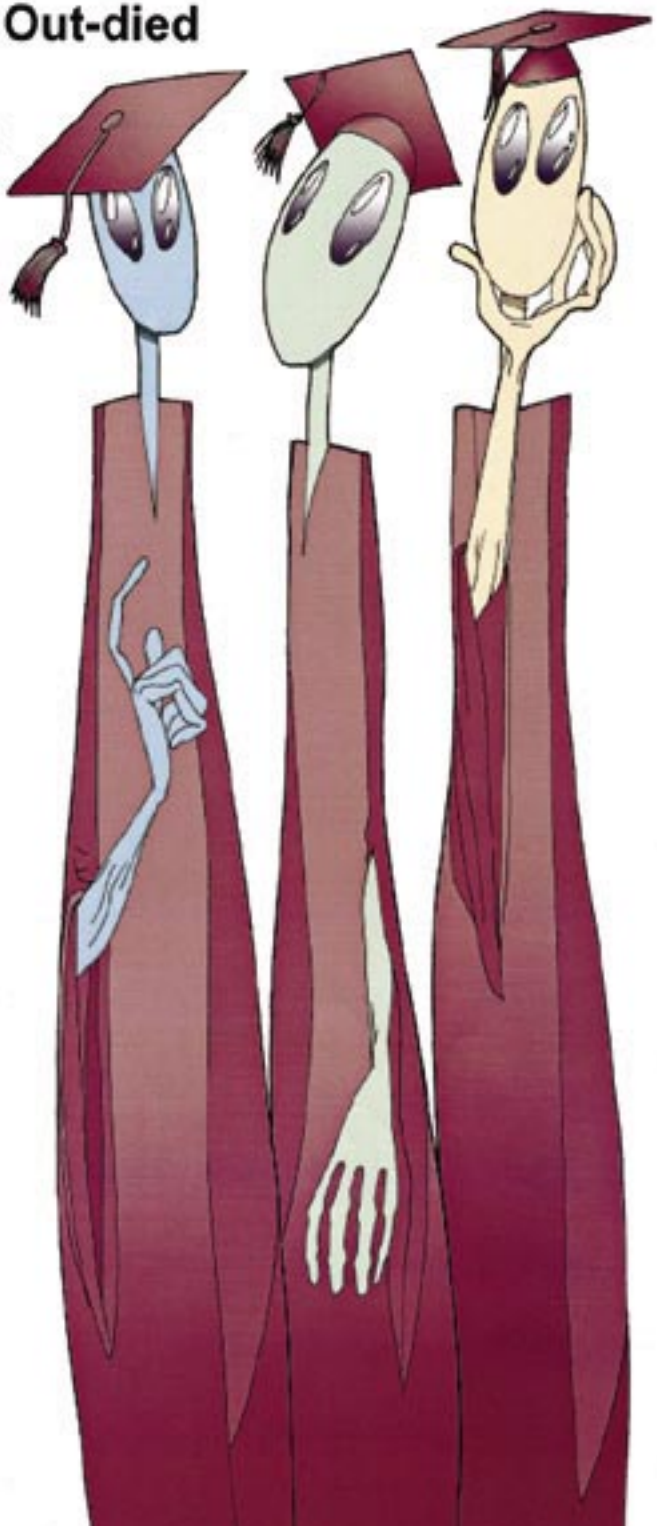
- measure capacity accurately;
- record data in a table;
- understand the concept of scale;
- relate results to larger or smaller scale;
- represent data as a graph.

Literacy Skills

Children should be able to :

- use persuasive arguments;
- write a letter to complain about a bypass;
- use computer technology to produce the letter in an appropriate layout or format.

How Humans Out-died



When the Martians landed
in the world they'd been handed
there were no humans left.

They said, 'Do know we how
humans did how out-die?
Mystery is it? Or why?'

One clever young Martian
stepped forward:

'I how know
that humans out-died:
much car
much carbon
much carbon-dioxide.
Exhausted by exhaust;
they car-bon diox-died.'

At that,
another clever young Martian
stepped forward and said:

'Oh no!
Not so!
No oh!

No more rain it was.
That was a pain it was.
That was a strain it was.

So,
it was not so
that humans <u>died</u> out.
What it was,
was that
humans <u>dried</u> out.'

But then a third clever young Martian
stepped forward and said:

'Humans had old song and sad
and how they sang is this:
'Whatta loada rubbish!
Whatta loada rubbish!

How right were humans
to sing this song so sad
How right were humans
to feel so bad.

For,
rubbish they made
more and more
till the world it filled
from shore to shore.

And that's how
can I tell
was in the world
a terrible smell.

It stank and stank so much,
I thinked
they in the end
became ex-stinked.'

And the Martians all said:

'How right that sounds,
now know we the history
how humans out-died.
Now solved is the mystery.'