Elementary Scientific English Practice

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LONGMAN GROUP LIMITED
London

Associated companies, branches and representatives throughout the world

First published 1967
New impressions *1968 (twice); *1970 (twice); *1971 (twice); *1972; *1973 (twice); *1975 (twice); *1976 (twice) *1977

ISBN 0 582 52183 1

By the same author

AN OUTLINE OF ENGLISH LITERATURE
CHANGING HORIZONS
EASIER ENGLISH PRACTICE
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TELEVISION PLAN
TURNING WHEELS
WAYS OF THE WORLD

Printed in Great Britain by
Lowe & Brydone Printers Limited, Thetford

Foreword

THIS book provides pieces of English which are suitable for scientists but are simple in language. The first ten pieces are at the standard of Longmans' Structural Readers, Stage 4. The rules of those Readers are strictly kept here. The next ten passages (11–20) are slightly harder, though the repetition technique for scientific words is still followed. The last ten pieces are of a higher standard, so as to lead the reader towards the language of other science writers, such as those whose work may be found in *Easier Scientific English Practice*.

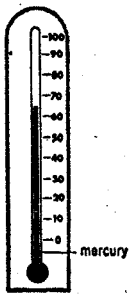
G.C.T.

Contents

1. Hot Metal

WHEN we heat anything, it expands. It grows bigger than it was before. This fact is important. Metals expand a lot.

How do we find the temperature of anything? When a boy is ill, a doctor usually takes his temperature. He puts a thermometer in the boy's mouth. The boy has to keep the thermometer under his tongue. A minute later, the doctor takes it out and looks at it. Why does he do this?



a thermometer

The temperature of the boy's body usually rises when he is ill. The thermometer measures this temperature. Sometimes the temperature is quite high. This shows the doctor that the boy is very ill.

A doctor's thermometer is made of glass. There are some figures on the glass. The glass itself is a tube and there is some mercury in the tube. The boy's tongue makes the mercury warm; so it expands. The top of the mercury runs up the tube. It reaches a place near one of the figures, and stops there. The doctor can see the top of the mercury, and he can see the figure near it. This figure shows him the boy's temperature.

Some thermometers are not made of glass. These measure

higher temperatures. We can measure the temperature of a fire which is heating some metal; but we cannot use a glass thermometer. We have to use something stronger.

When the mercury is heated, it expands. Other things also expand when they are heated. The rails on a railway expand on a hot day. Sometimes you may notice spaces between the ends of the rails. The wheels of the train make noises when they cross these spaces. On a cold day the ends of the two rails do not meet; but on a hot day each rail expands. Then the two ends get nearer together.

Telegraph wires expand in the summer. They get longer. Then the wire between two posts gets lower in the middle.

Very often a machine is made in different pieces. Then we have to fit the pieces together. Perhaps there is a metal ring, and the ring has to go on a tube. It is not bigger, and so it does not easily go on. But we can heat the ring first. Then it will expand. Then we can easily put it in its proper place on the tube. When it cools, it will contract. It will return to its old size, and then it will be tight on the tube. So we have only to wait until it cools; then the work is done.

Some men once tried to drive a ring on a tube. They hit it hard, and so, of course, it broke. They got another ring and hit that harder than the other. It also broke. "Very bad metal!" they cried angrily. Another man saw them throwing the pieces away. He came to look, and heated another ring. It expanded, and easily went into its place on the tube. Then it contracted and held the tube tightly.

EXERCISES

1. Put a word in each space.
   expands; temperature; thermometer; wire; contract
   (*a*) "What is the — of the ice?" the teacher asked.

(*b*) Most metals — when they get cooler.
(*c*) The picture was hanging on a piece of —
(*d*) If the ring —, it will go on.
(*e*) The doctor put a — under the girl's tongue

2. Notice: *The temperature rises when he is ill.*
Complete these sentences:

(*a*) The temperature falls when (better)
(*b*) We know the temperature when (thermometer)
(*c*) The rails expand when they (hot)
(*d*) The rails contract when
(*e*) When he hit the metal, it

3. Notice: *Another man saw them throwing the pieces away*
We can also say: I heard him singing.
He watched them running.
Complete these sentences:

(*a*) Peter saw the soldiers . . .
(*b*) All the people heard the bell .
(*c*) I watched the insects . . .
(*d*) He did not see the car . . .
(*e*) I have never heard a bird .

4. Notice: *If we try to push it on, we cannot.*
Complete these sentences properly:

(*a*) If a boy tries to fly, he . . .
(*b*) If Peter heats that tube tomorrow, it
(*c*) If you give him a bicycle, he .
(*d*) Peter will be angry if
(*e*) The doctor will know the boy's temperature if

5. Notice: *The boy has to keep the thermometer under his tongue*
Put the right form of *have to* in the spaces. Note: *Have to* = *must*

(*a*) Tomorrow I — go to the garage
(*b*) Yesterday Peter — repair his bicycle
(*c*) We always — stick stamps on our letters
(*d*) He always — stick stamps on his letters
(*e*) They — put the ring in the fire in order to heat it

2. Sir Walter Raleigh

DOCTORS tell us not to smoke; but a lot of people smoke tobacco every day. Long ago, no one in Europe smoked; the tobacco plant was unknown there. It grew in America, and Christopher Columbus found it there. Later, he returned to Europe and told everyone about tobacco. He said that the American Indians often smoked it.

One way of smoking was this. The American Indians threw some tobacco leaves on a fire. Then they put long tubes in their mouths. The other ends of the tubes were over the fire; so they were able to draw the smoke into their mouths.

About the year 1560 a Frenchman, Jean Nicot, was living in Lisbon, Portugal. He was very interested in all American plants; some of them were very different from the plants of Europe. He (and other men too) used the leaves of the tobacco plant to cure pain. Perhaps a man had a bad pain in a leg or an arm. Nicot put tobacco leaves on the painful place, and tried to cure the pain in that way. We say now that tobacco contains *nicotine*. The word *nicotine* comes from this man's name.

Tobacco was used as a cure in many ways. Sometimes a horse was so ill that it could not walk properly. Then a man blew some tobacco smoke into the horse's nose. He believed that this made the horse better! Poor horse! Nobody blows smoke at horses now.

Sir Walter Raleigh was a famous man in the days of Queen Elizabeth the First. He travelled widely and learnt to smoke. Then he returned to England, but he did not stop smoking. He used to smoke two pipes every day secretly in his room. When anyone came in, he quickly hid his pipe; but one day —the story is told—he was not quick enough. A man came in and found clouds of smoke in the room. More smoke was

coming from Raleigh's mouth, so the man got some water and threw it over Raleigh. He believed that Raleigh was burning. He ran out of the house and told everybody about it.

After this, smoking was not a secret. Raleigh told Queen Elizabeth about it. He added that he could weigh his smoke. She did not believe this, and she asked him to explain.

"First," he said, "I shall weigh the tobacco. Then I shall put it in my pipe and smoke it. Then I shall weigh the ashes which remain. I can take them out of the pipe and weigh them on a balance. There will be a great difference between the two weights. The tobacco must be heavier than the ashes. The difference between them must be the weight of the smoke."

It was a good plan, but Raleigh was wrong. When anything burns, it needs oxygen. It usually gets the oxygen from the air. When Raleigh's tobacco burned, it did this; but the oxygen was not in the tobacco at the beginning. It was added when Raleigh smoked his pipe. So the smoke was heavier than the difference between the two weights. The weight of the oxygen was added.

Raleigh had a sad life and died in 1618. He died bravely and quietly. He smoked a pipe just before his end.

EXERCISES

1 Put one of the words in each space.
cured; pain; weight; ashes; oxygen

(*a*) After the great fire, only — remained.
(*b*) I shall have to go to the doctor, I have a — in my arm.
(*c*) When we breathe, we use the — of the air.
(*d*) When Peter was — he got up.
(*e*) The — of the lorry was so great that the bridge broke.

2. Answer these questions:
   (*a*) Where was Nicot living in 1560?
   (*b*) Where did Columbus find the tobacco plant?
   (*c*) Where did Sir Walter Raleigh smoke secretly?
   (*d*) Why did the man throw some water over Raleigh?
   (*e*) What mistake did Raleigh make when he was weighing the ashes?

3. Put the proper words in the spaces. The piece will help you:
   (*a*) Nobody — Europe smoked at that time.
   (*b*) He can easily draw the smoke — his mouth.
   (*c*) We found Peter — his room.
   (*d*) They are going to tell the pilot — the aircraft.
   (*e*) Galileo died — 1642.

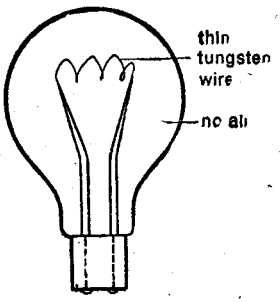
4. Notice: *Tobacco was used as a cure.* Form A.
   This means: *They used tobacco as a cure.* Form B.
   These sentences are in Form B. Put them into Form A:
   (*a*) They never use tobacco as a cure now.
   (*b*) They will repair the bicycle immediately.
   (*c*) They have spent all the money.
   (*d*) He has cured the pain.
   (*e*) They weighed the ashes.

5. Notice: A horse was *so* ill *that* it could not walk. (This shows the result of being ill.)
   Complete these sentences:
   (*a*) He smoked so much that he . . . (ill)
   (*b*) The salt was so heavy that the balance . . .
   (*c*) The pain was so terrible that . . .
   (*d*) Newton worked — hard — he forgot his friends.
   (*e*) The horse's legs were so weak . . .

3 Electric Wire

ELECTRIC wire is usually made of copper. Copper lets the electric current flow easily through it. We say that it has a low resistance. Some other metals also have a low resistance, but copper is the most useful. There are copper wires in millions of houses in the world.

These wires carry the current to our lamps. There is a thin wire inside an electric lamp; you can see it if you look carefully. A thin wire has a higher resistance than a thick one. It tries to stop the flow of current. Then it gets very hot.



electric lamp

The thin wire is not made of copper; it is made of tungsten. All metals melt when they get hot. (Mercury melts at a lower temperature than our usual ones.) Tungsten does not melt easily. It has to be very hot indeed before it melts.

When the tungsten gets hot, it also gets bright. It shines and gives a good light. It also lasts a long time without breaking.

An American, Edison, invented the first small electric lamp. He wanted a thin wire for his lamp, and tried to make

one; but he had a lot of trouble. Thin wires easily melt if they are made of copper. He decided to use carbon because it does not melt. He tried cotton and hundreds of other materials to make his thin piece of carbon. But at first all of them broke. They were too thin and weak. They had to be thin because they had to shine brightly. Thick pieces do not have a high resistance. So they did not get hot enough, and they gave no light. Edison did not stop trying; and after a lot of trouble he made his first lamp.

Our tungsten lamps are better than the old carbon lamps. They are brighter and they last longer. The tungsten does not easily melt or break. There is not much air inside an electric lamp; we have to take it out. Air contains oxygen, and the hot tungsten could burn in it. Usually we put some gas in the place of the air.

Electric fires also have wires which get hot. These wires are thick, but they are not made of copper. They have a high resistance. A large current flows through them and makes them hot. So we can use electric fires in winter to keep us warm.

In some houses an electric current also makes the water hot. This is useful when we want a bath. The wires get hot like the wires of electric fires; but we must keep them away from the water. We have to separate the wires from the water with some special material. It is not safe to let an electric wire touch water. Water has a low resistance to an electric current. Sometimes a man touches an electric wire with a wet hand; he ought not to do this. He may kill himself. The water lets the current flow easily to his body. Then it can escape to the ground through his legs. The current can easily flow through his body; and it can go through his heart. Then his heart will stop beating.

EXERCISES

1. Put the proper word from the list in each space:
copper; current; resistance; melted; carbon.
   (*a*) The terrible heat — all the metal.
   (*b*) Edison needed a thin piece of — for his lamp.
   (*c*) Most electric wires are made of —.
   (*d*) Air has a high — to the flow of an electric current.
   (*e*) A large — will make the wires hot.

2. Put the word *not* in its proper place in these sentences:
   (*a*) He ought to do this.
   (*b*) His heart will stop beating.
   (*c*) He has found the thermometer.
   (*d*) The house is made of metal.
   (*e*) Tungsten is cheap.

3. Change the first word below to *No*. Make any other necessary changes:
Example: Yes, it contains oxygen.
Answer: No, it does not contain oxygen.
   (*a*) Yes, this wire leads to a lamp.
   (*b*) Yes, this metal lasts a long time.
   (*c*) Yes, he tried cotton first.
   (*d*) Yes, we have to take it out.
   (*e*) Yes, Peter touched the electric wire.

4. Put the right word in each space:
   (*a*) The wire is made — copper.
   (*b*) There are millions of electric lamps — the world.
   (*c*) We need a brighter lamp — this big room.
   (*d*) Many poor people are cold — winter.
   (*e*) They had to separate the bits of carbon — the ash.

5. Notice: *Electric fires have wires which get hot.*
This means: Electric fires have wires. These wires get hot.
Join each of the following pairs into one sentence. Use *which* or *who*:

(*a*) Sir Walter Raleigh was the man. He smoked tobacco.
(*b*) Tungsten is a metal. It does not easily melt.
(*c*) This is the metal. He was melting it.
(*d*) The piece of carbon was very thin. Edison used it.
(*e*) The thermometer was made of glass. The doctor broke it.

4. Light

LIGHT travels very fast. It moves at 186,300 miles a second; that is 300,000 kilometres a second. Light reaches us from the moon in less than a second and a half. The moon is about 238,800 miles from us; it is more than 380,000 kilometres away.

Light from the sun reaches us in 8½ minutes. The sun is about 93 million miles from the earth.

The stars are farther away than the sun. Light from the nearest star reaches us in about four years. When you look at a star you do not see its present condition. You see it as it used to be. Light from some stars takes hundreds of years to reach us. We never see a star as it is now. We see it as it was long ago, perhaps hundreds or thousands of years ago.

Astronomers watch the stars through big telescopes. Some of these telescopes have glass lenses in them. A lens is a round piece of glass, but it is not flat. The side of a lens is curved. The middle part of some lenses is thicker than the edge. In other lenses, the edge is thicker than the middle part.

Cameras have lenses at the front. A very good lens costs a lot of money: it costs more than any other part of the camera.

glass lenses

A ray of light usually travels in a straight line; but sometimes it bends. The light reaches the film of a camera through the lens. It leaves the air and goes into the glass; then it bends. The ray also bends when it leaves the glass. Light also bends when it reaches the lens of a telescope.

Some telescopes do not use a lens at the front. They use a curved mirror at the back. A curved mirror is better than a lens in some ways.

The world's biggest telescope is on Mount Palomar in America. Near it, on Mount Wilson, there is another big telescope. Both of them use mirrors, not lenses at the front. With these great telescopes astronomers can see stars and other things very far away. Some of these things are not only stars. They are great groups of stars.

The earth is in a great group of stars. There are about 100,000,000,000 stars in it. We call this group the galaxy. Outside the galaxy there is empty space; but thousands of millions of miles away there is another galaxy. Light from this other galaxy reaches us after about 2 million years. There are millions of these galaxies; and they appear to be rushing away from us. The astronomers at Mount Palomar and Mount Wilson can see some of them well; but they cannot see one as it is now. The light takes millions of years to arrive here; so they see a distant galaxy as it used to be. The light left it millions of years ago. It travelled across space and then went into an astronomer's eye. Perhaps no men were living when it started.

EXERCISES

1. Put one of the given words in each space:
astronomer; telescope; lens; mirror; galaxy.
   (*a*) The sun is a star in our —.
   (*b*) Peter's camera has a — at the front.
   (*c*) The — watched the moon all night.
   (*d*) Mary combed her hair in front of the —.
   (*e*) The world's biggest — is on Mount Palomar.

2. Answer these questions:
   (*a*) How fast does light travel?
   (*b*) How far is the sun from the earth?
   (*c*) What work do astronomers do?
   (*d*) What is the distance between the moon and the earth?
   (*e*) Are most of the galaxies coming towards us?

3. Put the proper word in the space:
   (*a*) The light from that star reaches us — eighty years.
   (*b*) Yesterday Peter looked — a big telescope.
   (*c*) Light usually moves — a straight line.
   (*d*) The light has travelled — space.
   (*e*) A galaxy is a very large group — stars.

4. Notice: *Perhaps no men were living when it started.*
Complete these sentences:
   (*a*) Peter was tired when he . . .
   (*b*) You do not see the present condition of a galaxy when you . . .
   (*c*) Rays of light bend when . . .
   (*d*) When the doctor cures our pain, we . . .
   (*e*) Metal expands when we . . .

5. Notice: *A curved mirror.*
Put one of the given words in each space:
beaten; broken; coloured; measured; spoken.
   (*a*) Put the — amount into the bottle.
   (*b*) A — bottle does not hold water.