

# Entry Level

## Edexcel Entry Level Certificate in Science (8938)

First certification June 2007

June 2006

360Science: The student-  
centred curriculum

**Note:** This is not the cover with which the document will be published. The cover will be added by printers once designed externally.

Edexcel, a Pearson company, is the UK's largest awarding body offering academic and vocational qualifications and testing to more than 25,000 schools, colleges, employers and other places of learning here and in over 100 countries worldwide. We deliver 9.4 million exam scripts each year, with 3 million marked onscreen in 2005. Our qualifications include GCSE, AS and A Level, GNVQ, NVQ and the BTEC suite of vocational qualifications from entry level to BTEC Higher National Diplomas and Foundation Degrees. We also manage the data collection, marking and distribution of the National Curriculum Tests at Key Stages 2 and 3, and the Year 7 Progress Tests.

*References to third-party material made in this document are made in good faith. Edexcel does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)*

Authorised by Roger Beard

Prepared by John Crew

Publications code W018353

All the material in this publication is copyright

© Edexcel Limited 2006

# CONTENTS

---

<b>Introduction</b>	<b>1</b>
Key features	1
Structure of the qualification	2
<b>Specification aims and assessment objectives</b>	<b>3</b>
National Qualifications Framework criteria	3
Aims	3
Assessment objectives	3
<b>Scheme of assessment</b>	<b>5</b>
Practical skills	5
Unit tests	5
Assignments	6
<b>Specification content</b>	<b>9</b>
<b>Unit index</b>	<b>11</b>
Unit 1: Survival in Nature	13
Unit 2: Cells, DNA and Diseases	18
Unit 3: Sending Messages Around the Body	21
Unit 4: Staying Fit and Healthy	25
Unit 5: What are Things Made From?	29
Unit 6: Making Changes	33
Unit 7: There's One Earth	38
Unit 8: Properties of Materials and their Uses	43
Unit 9: Electricity: its Production and its Applications	47
Unit 10: Energy to Make Things Work	53
Unit 11: Electromagnetic Waves and their Uses	58
Unit 12: Exploring the Earth and Space	63

<b>Specimen assessments</b>	<b>67</b>
Specimen test: Unit 1: Survival in Nature	69
Specimen test mark scheme: Unit 1: Survival in Nature	73
Specimen assignment: Unit 2: Cells, DNA and Diseases	74
Specimen assignment mark scheme: Unit 2: Cells, DNA and Diseases	77
Specimen test: Unit 7: There's One Earth	78
Specimen test mark scheme: Unit 7: There's One Earth	82
Specimen assignment: Unit 7: There's One Earth	84
Specimen assignment mark scheme: Unit 7: There's One Earth	87
Specimen test: Unit 9: Electricity – its Production and its Applications	88
Specimen test mark scheme: Unit 9: Electricity – its Production and its Applications	93
<b>Assessment issues</b>	<b>94</b>
Entry Level descriptions	94
Moderation of internally assessed components	95
Internal moderation	95
External moderation	95
Awarding and reporting	96
Requirements for certification	96
Prior learning and progression	97
Language of assessment	97
Forbidden combinations and links with other subjects	97
How to obtain the test papers and assignment papers	97
Students with particular requirements	97
Enquiries about results and appeals	97
<b>The wider curriculum</b>	<b>98</b>
Spiritual, moral, ethical, social and cultural issues and education for citizenship	98
Environmental issues	99
Health and safety considerations	100
The European dimension	101
Information and communications technology (ICT)	102
Literacy skills	103
Numeracy skills	104

<b>Appendix 1: Record sheet for unit tests and assignments</b>	<b>105</b>
<b>Appendix 2: Obtaining an overall mark</b>	<b>107</b>
<b>Appendix 3: Qualification codes</b>	<b>109</b>
<b>Appendix 4: Record sheet for the assessment of practical skills</b>	<b>111</b>



# Introduction

---

The Entry Level Certificate in Science allows students to achieve at National Curriculum Levels 1, 2 and 3. It provides entitlement to the science national curriculum at Key Stage 4.

The specification is designed to link directly to the Edexcel GCSE Science qualification. However, it is possible to co-teach this qualification with any GCSE Science specification and students may be entered for both the Entry Level Certificate in Science and GCSE Science.

## Key features

- Provides entitlement to the Programme of Study for Key Stage 4 Science.
- Recognises achievement at National Curriculum Levels 1, 2 and 3.
- Meets the needs of students with special educational needs.
- Motivates students by recognising small steps of achievement.
- No terminal examination.
- 100% teacher assessed, based on tests, assignments and practical skills.
- Flexible teaching and assessment approaches.
- Allows students to achieve a Certificate in Science at Entry Level.
- Has clear links to Edexcel GCSE Science.
- Free support material.
- Professional training.

## Structure of the qualification

The Entry Level Certificate in Science consists of four biology units, four chemistry units and four physics units.

Students will need to complete assessments in at least two different units in order to achieve a grade. See page 107 for further details.

Entry Level Certificate in Science	
Unit	Content
<b>Biology units</b>	
1	Survival in Nature
2	Cells, DNA and Diseases
3	Sending Messages Around the Body
4	Staying Fit and Healthy
<b>Chemistry units</b>	
5	What are Things Made From?
6	Making Changes
7	There's One Earth
8	Properties of Materials and their Uses
<b>Physics units</b>	
9	Electricity – its Production and its Applications
10	Energy to Make Things Work
11	Electromagnetic Waves and their Uses
12	Exploring the Earth and Space

### Links to GCSE Science

All units, except *Unit 10: Energy to Make Things Work*, map directly to the units in the Edexcel GCSE Science qualification to facilitate co-teaching.

# Specification aims and assessment objectives

---

## National Qualifications Framework criteria

This is an Entry Level Qualification. The specification is based on the common criteria and the Entry Level criteria, which are prescribed by the regulatory authorities and are mandatory for all awarding bodies. Entry Level is recognised as the first level of the National Qualifications Framework.

## Aims

This qualification gives students opportunities to:

- acquire a body of basic scientific knowledge and an understanding of some important scientific ideas
- develop basic experimental and investigative abilities
- recognise the difference between scientific and non-scientific ideas and explanations
- develop a basic understanding of some of the important technological and environmental applications of science and of the economic, ethical and social implications of these
- develop literacy, numeracy and ICT skills as appropriate to the student and centre resources
- develop an interest in science leading to further study at a higher level, eg GCSE Science
- meet the requirements of students with learning and behavioural difficulties.

## Assessment objectives

This specification requires that all students demonstrate the assessment objectives in the different contexts of the content and skills prescribed. Students will be assessed on their ability to:

- perform simple experiments in which they carry out fair testing, follow procedures, take basic measurements, record observations and organise and present their results
- interpret experimental data and draw conclusions
- recognise, recall and use the scientific knowledge set out in the specification
- communicate observations and ideas using basic scientific and technical vocabulary
- make decisions based on simple scientific information.

Within each of the assessment objectives the assessment must take account of the student's ability to communicate clearly and logically, using specialist vocabulary and conventions where appropriate.

The Entry Level Certificate in Science is teacher assessed through unit tests, assignments and practical work.

# Scheme of assessment

---

The Certificate is awarded at one of three levels: Entry 1, Entry 2 and Entry 3, with Entry 1 being the lowest level of achievement and Entry 3 the highest.

For each level, assessment is based on three components:

- practical skills           20% internally marked, non-moderated
- unit tests                 50% internally marked, externally set and moderated
- assignments             30% internally marked, externally set and moderated.

Although each unit has an associated unit test and assignment, up to five test results and up to three assignments need to be submitted from different units, together with the mark for practical skills to determine the level of achievement (further details can be found in *Appendix 2: Obtaining an overall mark* on page 107).

All components require students to use scientific, technical and mathematical language, conventions and symbols where appropriate. Each component is described below.

## Practical skills

This component assesses students' ability to select and set up equipment, follow experimental procedures safely, collect data and present results. Marks are recorded on a mark sheet that is included in *Appendix 4* (page 111). The mark awarded should reflect each student's best performance from any practical that is undertaken during the course. The mark will not be subject to moderation and no accompanying evidence is required.

For teacher-assessed components that are not subject to external moderation, Edexcel reserves the right to:

- make it a requirement that centre staff undertake appropriate training to ensure the correct application of the marking criteria
- request a centre to reconsider submitted marks if doubt exists regarding their accuracy
- following the bullet point above, in exceptional circumstances, review the marks and issue alternative awards
- arrange a centre visit to inspect procedures for the award of teacher-assessed marks.

## Unit tests

Each unit has an associated test. Unit tests will be used to assess students' knowledge and understanding of scientific concepts. Questions will require students to recognise, recall and use scientific knowledge. Edexcel will provide unit tests and mark schemes. Specimen tests and mark schemes are provided in this specification (see page 67).

The tests:

- are provided as photocopiable masters
- are confidential and must be kept under secure conditions with the teacher's mark scheme at all times
- each have a maximum of 15 marks
- are not time limited
- should be given at an appropriate time for each student or group of students
- can be set in normal classroom conditions, but other examination procedures regarding invigilation and safeguards against communication between students should be observed
- may be read to students by the teacher; individual oral responses may be recorded (by written or audio means) where judged necessary
- must not be taken out of the teacher's direct supervision
- are to be collected and marked by the teacher according to the published mark scheme
- are moderated by Edexcel.

Marks and feedback on content can be given to the students who have taken the test, but no relevant material may be retained by students.

### Types of questions used in the test

Different types of question are used in the tests, including some of the following:

Types of questions
<ul style="list-style-type: none"><li>• Single word response.</li><li>• Multiple-choice questions.</li><li>• Word boxes in various forms, three to six words in a box – words to be used once only and all words used.</li><li>• Simple perspective drawings and diagrams.</li><li>• Simple arithmetic.</li><li>• Word boxes in various forms, four to six words in a box – words to be used once, more than once or not at all.</li><li>• Simple free response.</li></ul>

## Assignments

Each unit has an associated assignment. Edexcel will provide the assignments and mark schemes. Specimen assignments and mark schemes are provided in this specification (see page 67).

The assignments:

- are provided as photocopiable masters
- are confidential and must be kept under secure conditions with the teacher's mark scheme at all times
- each have a maximum of 15 marks
- are not time limited
- should be given at an appropriate time for each student or group of students
- can be set in normal classroom conditions, but other examination procedures regarding invigilation and safeguards against communication between students should be observed
- may be read to students by the teacher; individual oral responses may be recorded (by written or audio means) where judged necessary
- must not be taken out of the teacher's direct supervision
- are to be collected and marked by the teacher according to the published mark scheme
- are moderated by Edexcel.

Marks and feedback on content can be given to the students who have taken the assignment, but no relevant material may be retained by students.

Assignments may include some of the following tasks:

Assignment tasks
<ul style="list-style-type: none"><li>• Plan (but not carry out) an experiment.</li><li>• Identify equipment needed for a specific purpose.</li><li>• State what would be observed in given practical situations, eg describe what happens when carbon dioxide passes through limewater.</li><li>• Describe how to carry out simple scientific tests, eg test for carbon dioxide.</li><li>• Draw graphs, pie or bar charts using data provided by Edexcel.</li><li>• Interpret simple pie and bar charts, tables and histograms, and extract data from simple data tables.</li><li>• Recognise trends/patterns in simple data tables and line graphs.</li><li>• Draw conclusions from experimental results provided by Edexcel.</li><li>• Suggest how an experiment may be improved.</li></ul>



## Specification content

---

It should be noted that the targeted levels of knowledge, understanding and skills required for the specification are Levels 1-3 of the National Curriculum. Whilst providing access to the Programme of Study for Key Stage 4 Science, in general the activities require a lower level of understanding than that specified for Key Stage 4.

Students will be assessed on their knowledge and understanding of the topics and on associated process skills. These are listed in the first column on each of each page that describes the unit content.

The second column lists some *suggested* activities, which may be used if appropriate to students' abilities, resources and time available. They do not form part of the assessment requirements.

Please note that practical work, depending on the circumstances, may be carried out by individuals, shared within groups or by the whole class. Alternatively it may be demonstrated by the teacher.

**In all aspects of practical work, students are required to consider the safety of themselves and others. Centres are responsible for the overall risk assessment of experimental work undertaken by students.**



# Unit index

---

<b>Unit 1: Survival in Nature</b>	<b>13</b>
<b>Unit 2: Cells, DNA and Diseases</b>	<b>18</b>
<b>Unit 3: Sending Messages Around the Body</b>	<b>21</b>
<b>Unit 4: Staying Fit and Healthy</b>	<b>25</b>
<b>Unit 5: What are Things Made From?</b>	<b>29</b>
<b>Unit 6: Making Changes</b>	<b>33</b>
<b>Unit 7: There's One Earth</b>	<b>38</b>
<b>Unit 8: Properties of Materials and their Uses</b>	<b>43</b>
<b>Unit 9: Electricity: its Production and its Applications</b>	<b>47</b>
<b>Unit 10: Energy to Make Things Work</b>	<b>53</b>
<b>Unit 11: Electromagnetic Waves and their Uses</b>	<b>58</b>
<b>Unit 12: Exploring the Earth and Space</b>	<b>63</b>



## Unit 1: Survival in Nature

While studying this unit, students will explore:

- living things
- evolution
- producers and consumers
- the environment.

Students are expected to undertake practical work and collect data in order to test simple ideas. Students should draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Students should be encouraged to use ICT, eg to produce posters showing food chains, to write up experiments and to produce leaflets to show where different species live.

Knowledge, understanding and process skills	Suggested activities
<p><b>Living things</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• discuss the many kinds of living things, including humans</li> <li>• distinguish between different kinds of living things</li> <li>• describe that different living things are found in different habitats depending on the type of climate, soil, etc</li> <li>• describe some animals and plants which live in water and some which live on land</li> <li>• investigate how some plants and animals are suited to their particular environments.</li> </ul>	<p>Observe a variety of living things, looking for distinguishing features, on visits (eg to a park, pond, woodland, garden). Students can research using the internet, books, clips of wildlife programmes etc. The BBC website – <a href="http://www.bbc.co.uk/nature">www.bbc.co.uk/nature</a> – is a particularly good resource for this activity.</p> <p>List them as either plants or animals.</p> <p>Collect and observe some organisms in places such as woodland, lawn, wall, hedgerow, pond, leaf litter.</p> <p>Record observations by means of posters, photographs etc.</p> <p>Do some research to find out some common features of plants/animals in ponds, on land and in the air.</p> <p>Match the characteristics of some unusual plants and animals to their environment. The BBC website has many examples of very unusual animals and how they have adapted to survive in their environment.</p> <p>Use meters and thermometers to measure light intensity and moisture levels (or dataloggers) in a habitat and relate these to the animals and/or plants living in the habitat.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Evolution</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain that fossils provide evidence for evolution</li>   <li>• describe ways in which individuals within a species can vary</li> <li>• describe the characteristics of some individuals that give them an advantage over other individuals, and how these characteristics will help them survive to pass on these characteristics to their offspring. ‘Survival of the fittest’</li>   <li>• explain that we sometimes need to count the numbers of living things of one kind living in an area.</li> </ul>	<p>Show images or samples of fossilised animals and/or plants eg insects in amber etc.</p> <p>Discuss why the discovery of fossils is so important. Draw students’ attention to the fact that fossils are still being discovered and providing useful information on evolution.</p> <p>Students could make their own fossil.</p> <p><i>Folens Success in Foundation Science, Book 1 (ISBN 1843031779) See pages: 30 and 31.</i></p> <p>Use quadrats to investigate how many plants of one kind (eg dandelions) there are in an area (eg lawn).</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Producers and consumers</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate whether green plants need light for photosynthesis</li> <li>• explain that animals cannot make their own food; they have to eat plants or other animals, which themselves eat plants (consumers); ultimately all food comes from plants</li> <li>• list some predators and their prey</li> <li>• explain the difference between a producer and a consumer</li> <li>• investigate the natural decay of waste materials that occurs over different periods of time</li> <li>• investigate the factors (moisture, warmth and oxygen) that effect decay.</li> </ul>	<p>Grow plants from seeds or cuttings in the light and in the dark.</p> <p>List some of the food eaten by students yesterday and trace it back to source (eg egg-hen-grain).</p> <p>Trace the food eaten by animals back to plants.</p> <p>CD ROM <i>Multimedia Science School – Food web</i> (New Media).</p> <p>Match images of predators and their prey.</p> <p>Watch videos of wildlife (take care regarding sensitivities of students).</p> <p>‘Make a Compost Column’ – see the SAPS website: <a href="http://www-saps.plantsci.cam.ac.uk/worksheets/worksheets/supsci2.htm">www-saps.plantsci.cam.ac.uk/worksheets/worksheets/supsci2.htm</a></p> <p>Discuss why recycling projects are thought to be necessary. Perhaps introduce a recycling project into the classroom.</p> <p>Identify which things can be reused or recycled.</p> <p>Plan and carry out an investigation to determine whether moisture, warmth and oxygen are all needed for decay to take place.</p> <p>Find out about garden composts.</p> <p>Fact: a potato could be baked inside a large compost heap. How is this possible?</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>The environment</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• evaluate the harmful effects of chemicals, added by humans, on land and the atmosphere</li> <li>• explain the importance of reducing the amount of chemicals added to the environment</li> <li>• investigate whether gases produced by burning fossil fuels (eg sulphur dioxide) can cause damage to the environment.</li> </ul>	<p>Discuss why many people prefer to buy organic food.</p> <p>Investigate the effect of acid rain (sulphur dioxide solution) on germinating seedlings.</p> <p>Use secondary sources to investigate whether increased levels of carbon dioxide are affecting the temperature of the oceans.</p>

## Unit 1: Survival in Nature

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples of some characteristics of animals which live in water and on land, using drawings or images</li> <li>• list the three conditions needed for decay</li> <li>• describe the difference between a producer and a consumer</li> <li>• use quadrats to estimate the number of plants in a given area</li> <li>• use meters to take measurements of light, moisture levels and temperature</li> <li>• predict whether light affects photosynthesis and carry out a simple experiment to investigate whether what they expected happened</li> <li>• use simple tables or charts to obtain information to identify whether increased carbon dioxide levels are affecting ocean temperature.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples of some of the characteristics of animals which live in a variety of habitats and describe how these characteristics help the animal survive</li> <li>• describe the conditions needed for decay to take place and explain what happens if one of the factors is removed</li> <li>• describe at least two food chains using examples of a relevant producer and at least two consumers</li> <li>• use quadrats to compare the number of plants in two distinct areas</li> <li>• accurately in a table, using the correct units, record readings for light, moisture and temperatures in a given habitat. Relate these measurements to the characteristics of the living things found in that habitat and discuss whether they agreed with predictions made</li> <li>• predict whether different light intensities affect the rate of photosynthesis and carry out a fair test, recording the results in a table</li> <li>• use simple tables or charts to obtain information to identify whether increased carbon dioxide levels are affecting ocean temperature and therefore are destroying coral reefs</li> <li>• describe the effect of an increase in chemicals used in farming and why people want to reduce the amount of chemicals used (eg organic farming).</li> </ul>

## Unit 2: Cells, DNA and Diseases

While studying this unit, students will explore:

- animal cells and tissues
- variations in humans
- genetic diseases
- social, moral and ethical issues concerning research into inherited diseases.

Students are expected to undertake some practical work to make observations and draw simple conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Ethical, moral and social considerations relating to cloning are considered, and the influence of genetic research on modern medicine is explored. The use of ICT to present experimental work should be encouraged; spreadsheets may be used to tabulate data obtained by students and produce graphs where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Animal cells and tissues</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• describe plants and animals as being made up of millions of very small units called cells; that cells group together to form tissues; and that groups of tissues form organs</li> <li>• recall that an animal cell has an outside covering, is filled with a watery liquid and contains the nucleus</li> <li>• identify the nucleus in diagrams of cells</li> <li>• recognise that chromosomes are found in the nucleus and control the cell</li> <li>• recognise the shape of the egg and the sperm.</li> </ul>	<p>Use a microscope to view and draw a cell (eg an onion cell). Have pre-prepared slides available for viewing, eg muscle, epithelial cells. Use the internet to find appropriate images. Prepare cards with names of cells, tissues and organs for students to match or get them to produce them. Place cards in the correct order.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">Cells</div> <div style="font-size: 2em;">➡</div> <div style="border: 1px solid black; padding: 2px 10px;">Tissues</div> <div style="font-size: 2em;">➡</div> <div style="border: 1px solid black; padding: 2px 10px;">Organs</div> </div> <p>Draw the nucleus in an outline cell.</p> <p>Draw and label the egg and the sperm.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Variations in humans</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>describe some differences between humans</li> <li>discuss that these differences (variations) between individuals are due to: <ul style="list-style-type: none"> <li>inherited characteristics (eg, ear lobe form, blood group)</li> <li>their different environments (weight, behaviour)</li> </ul> </li> <li>explain that every person inherits some characteristics from their mother and some from their father</li> <li>explain that information is transferred by the sex cells (egg and sperm) found in the nucleus at fertilisation – this is called sexual reproduction</li> <li>recall asexual reproduction leads to genetically identical individuals called clones</li> <li>evaluate the ethical and social concerns related to cloning.</li> </ul> <p><b>Genetic diseases</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>recall that diseases can be inherited</li> <li>discuss the issues facing a person who has a genetic disease</li> <li>discuss that scientists are currently carrying out research to: <ul style="list-style-type: none"> <li>prevent, treat and diagnose genetic diseases</li> <li>predict whether an embryo has an inherited disease.</li> </ul> </li> </ul>	<p>Survey differences in a group of students (eg eye colour, hair colour, hand span, foot size, height, weight, ear lobes).</p> <p>Allow students to list as many differences between humans as possible and identify them as either environmental or inherited. Discuss some of the characteristics that do not easily fit into one or the other.</p> <p>Consider characteristics (physical and emotional) in relation to those of parents. (Some are learned, some are inherited.) Take care if using class data.</p> <p><i>Folens Success in Foundation Science, Book 1 (ISBN 1843031779) See pages: 24 and 25.</i></p> <p><b>Sensitivity when discussing these diseases will be required. Teachers should use their professional judgement to select a genetic disease for discussion.</b></p> <p><i>Folens Success in Foundation Science, Book 2 (ISBN 1843031787) See pages: 34 and 35.</i></p> <p>Useful websites for some background reading are <a href="http://www.gig.org.uk/index.html">www.gig.org.uk/index.html</a> and <a href="http://www.dh.gov.uk/Home/fs/en">www.dh.gov.uk/Home/fs/en</a>.</p> <p>Factsheets could be provided to support students.</p>

## Unit 2: Cells DNA and Diseases

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• label the nucleus in a generalised animal cell</li> <li>• describe some differences between individuals and give one reason for these differences</li> <li>• describe sexual reproduction, eg by using a drawing</li> <li>• name one disease that can be inherited.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• label the nucleus in a cell and recognise it as containing chromosomes which control the cell</li> <li>• describe some differences between individuals and give the reasons for these differences</li> <li>• describe the difference between sexual and asexual reproduction</li> <li>• name at least two diseases that can be inherited and their related symptoms</li> <li>• give at least one reason for the ethical social concerns related to cloning.</li> </ul>

### Unit 3: Sending Messages Around the Body

While studying this unit, students will explore:

- the nervous system
- hormones
- keeping body conditions constant.

Students should collect data to test simple ideas and draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Some outcomes for this unit are expected to be achieved using practical work. The use of ICT to present experimental work should be encouraged; spreadsheets may be used to tabulate data obtained by students and produce graphs where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>The nervous system</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• recall the five senses – smell, sight, taste, touch and hearing – which work via sense organs</li> <li>• demonstrate the senses in class (care should be taken regarding any individuals' impairment(s))</li> <li>• explain that some muscle actions take place without conscious control and that these are called reflex reactions</li> <li>• recall that messages pass from sense organs to the brain and from the brain to muscles, and that these messages are passed by nerve cells</li> </ul>	<p>Point to sense organs on a diagram, model or person.</p> <p>Carry out tasting sessions (blindfold tests) of various foods – sweet, sour, salty, bitter.</p> <p>Investigate reflex reactions (take care!), eg pupil of eye in ordinary light and in shade, knee-jerk.</p> <p>Computer simulation.</p> <p><a href="http://www.censusatschool.ntu.ac.uk/phase4webform/phase4reaction.asp">www.censusatschool.ntu.ac.uk/phase4webform/phase4reaction.asp</a></p> <p>Measure reaction times (eg catching a falling ruler).</p> <p><i>Folens Success in Foundation Science, Book 1</i> (ISBN 1843031779) See page: 8.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• label an outline diagram of the eye to show the iris, pupil, lens, retina and optic nerve</li> <li>• describe the changes in the size of the pupil, controlled by the iris, in order to control the amount of light entering the eye (a reflex reaction)</li> <li>• recall that the image is sent to the brain by the optic nerve.</li> </ul> <p><b>Hormones</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• state that hormones: <ul style="list-style-type: none"> <li>– are chemical messengers</li> <li>– travel around the body in the blood</li> </ul> </li> <li>• state that insulin is made in the pancreas and helps control the amount of sugar in our blood</li> <li>• explain that: <ul style="list-style-type: none"> <li>– some diabetics cannot produce enough insulin and as a result their blood sugar levels cannot be controlled</li> <li>– recall that some diabetics can inject insulin into themselves to reduce the levels of sugar in their blood</li> </ul> </li> <li>• explain that manufactured sex hormones can be used for: <ul style="list-style-type: none"> <li>– contraception</li> <li>– treatment of infertility in women.</li> </ul> </li> </ul>	<p>Use a 3-D model of the eye to show the different structures within the eye. Stick labels onto a diagram of the eye.</p> <p><i>Folens Success in Foundation Science, Book 1</i> (ISBN 1843031779) See page: 9.</p> <p>Some useful CD ROMs include <i>Bodyworks</i> (The Learning Company); <i>3D Body Adventure</i> (Random House); <i>Ultimate Human Body</i> (Dorling Kindersley).</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Keeping body conditions constant</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• state that it is important to keep temperature and water balance in the body steady: <ul style="list-style-type: none"> <li>– body temperature (sweating can cool the body; shivering can warm it)</li> <li>– water balance (water is gained from food and drink and lost by breathing out, sweat, urine and faeces)</li> <li>– kidney controls the water content of the blood and produces urine for excretion (water loss).</li> </ul> </li> </ul>	<p>Look at data on people's body temperature and water gains and losses, if possible during various activities (eg running, sleeping) over a period of time.</p> <p>Discuss temperature when ill (eg fever) as a defence mechanism.</p> <p>Use a strip clinical thermometer to measure temperature (eg neck, hand, forehead).</p> <p>Measure the temperature of water in a beaker using a thermometer. Illustrate how sweating (water evaporation) cools the body by showing the temperature drop of a thermometer bulb wrapped in a damp cloth.</p>

### Unit 3: Sending Messages Around the Body

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• recall the five senses</li><li>• give one use of manufactured sex hormones</li><li>• state that insulin controls the amount of sugar in the body</li><li>• measure the reaction time of an individual using a simple method or computer simulation.</li></ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• label a diagram of the eye to show the iris, pupil, lens, retina and optic nerve</li><li>• give two uses of manufactured sex hormones</li><li>• state that insulin is made in the pancreas, controls blood sugar levels and cannot be produced by some diabetics</li><li>• measure the reaction time of an individual using a simple method or computer simulation a number of times and record measurements made.</li></ul>

## Unit 4: Staying Fit and Healthy

While studying this unit, students will explore:

- the functions of blood
- keeping the body healthy
- smoking alcohol and health
- exercise
- social, moral and ethical issues concerning alcohol and drugs.

Some outcomes of this unit are expected to be covered via practical work, eg measuring pulse rate and using a microscope. The use of ICT to present experimental work should be encouraged; spreadsheets may be used to tabulate data obtained by students and produce graphs where appropriate. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>The functions of blood</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• describe blood as consisting of white cells, red cells and plasma</li> <li>• explain that white cells fight infections, red cells carry the oxygen and plasma carries dissolved food and carbon dioxide</li> <li>• draw outline shapes of white cells and red cells.</li> </ul> <p><b>Keeping the body healthy</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• recall that microbes cause disease and that white blood cells defend the body against infections by ‘eating’ microbes</li> <li>• describe the positive and negative effects that drugs, including alcohol, can have on an individual’s health.</li> </ul>	<p>Look at prepared slides of red and white blood cells under the microscope or show a video.</p> <p>Draw cells as cartoon figures, showing what they do.</p> <p>Gather information to make a poster display showing effects of drug use (medicinal) and abuse.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Smoking, alcohol and health</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain how an individual's health can be affected by the use of tobacco</li> <li>• recall that smoking cigarettes produces tar and nicotine</li> <li>• describe the effect of these chemicals on: <ul style="list-style-type: none"> <li>– lungs (lung cancer, breathlessness and smoker's cough)</li> <li>– circulatory system (heart disease, lower birth mass of babies)</li> </ul> </li> <li>• evaluate some ways people use to try to give up smoking</li> <li>• describe some of the physical and harmful effects of alcohol on the human body</li> <li>• explore some of the social issues of drinking alcohol.</li> </ul>	<p>Discuss social pressures and effects of the use of alcohol and drugs.</p> <p>Look at media coverage of:</p> <ul style="list-style-type: none"> <li>• drink-driving incidents</li> <li>• effects of drinking alcohol.</li> </ul> <p>Produce a booklet/slogan to tell young people of the bad effects of alcohol and drug use.</p> <p>NB: Opportunities exist for links into the PSHE department and the centre's health education policy.</p> <p>Teacher demonstration to show the tar and acidic gases produced by burning a cigarette.</p> <p>Collect information on cigarettes and the effects of smoking.</p> <p>Produce a leaflet/poster on the dangers of smoking.</p> <p>Collect leaflets and other information on ways of helping a person to give up smoking.</p> <p>A possible useful website is <a href="http://www.quit.org.uk">www.quit.org.uk</a>.</p> <p>Discussion in class of the students' views of what alcohol does to the human body. Research the correct answers (internet and books).</p> <p>Produce a poster warning people of some of the consequences of drinking alcohol.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Exercise</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• state that exercise and diet are important in keeping fit</li> <li>• investigate the effect of exercise on: <ul style="list-style-type: none"> <li>– the pulse rate (heart rate)</li> <li>– the breathing rate</li> <li>– body temperature</li> </ul> </li> <li>• describe recovery rate as a measure of fitness</li> <li>• describe the effect lifestyle can have on the health of the circulatory system (eg smoking, drinking alcohol, high-fat diet, stress).</li> </ul>	<p>Measure pulse rate before, during and after exercise (possible data-logging exercise).</p> <p>Compare recovery rates after exercise by measuring pulse rates.</p> <p>Plan how to improve own fitness (activities, diet).</p> <p>Possible links to PSHE and health education policy.</p> <p><a href="http://www.bhf.org.uk">www.bhf.org.uk</a></p>

## Unit 4: Staying Fit and Healthy

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• name the white cells, red cells and plasma as the main components of blood</li> <li>• state one chemical in tobacco and how it affects the human body</li> <li>• label a diagram of a white blood cell and state that white blood cells defend the body against infection</li> <li>• use data provided to find out the effect of alcohol on reaction times</li> <li>• predict how exercise affects heart rate, carry out a simple experiment to measure pulse rate before and after exercise and state whether the results agree with the prediction</li> <li>• identify a simple pattern from a graph, eg how the number of cigarettes smoked by an individual relates to an increased risk of the individual dying from lung cancer.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• name the white cells, red cells and plasma as the main components of blood and describe one function of each</li> <li>• describe the effect of tar and nicotine on the lungs and circulatory system</li> <li>• label a diagram of a white blood cell, state that white blood cells defend the body against infection by destroying microbes that cause diseases</li> <li>• find out the effect of alcohol on reaction times by selecting information from more than one source provided for them</li> <li>• plan and carry out an experiment to determine whether exercise affects the pulse rate and breathing rate and record observations in a table</li> <li>• identify a simple pattern from a graph and suggest reasons for the pattern, eg how the number of cigarettes an individual smokes relates to an increased risk of the individual dying from lung cancer and give reasons for trends shown.</li> </ul>

## Unit 5: What are Things Made From?

While studying this unit, students will explore:

- how elements may be arranged to form the periodic table
- information that shows patterns and trends that exist in the periodic table
- scientific terminology to communicate information about elements and compounds including symbols and simple formula representations
- elements, compounds and mixtures
- some properties of metals and non-metals.

Students are expected to undertake practical work to achieve some outcomes, eg investigating compounds and mixtures, conduction of thermal energy and electricity in metals and non-metals, and factors affecting speed of reactions. The use of ICT to present experimental work should be encouraged; spreadsheets may be used to tabulate data obtained by students and produce graphs where appropriate. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Atoms</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain that an element consists of very small particles called atoms</li> <li>• explain that a molecule is two or more atoms joined together</li> <li>• explain that a compound is a molecule made of two or more different elements.</li> </ul> <p><b>Patterns of elements</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• group elements as metals or non-metals</li> <li>• locate blocks of metals and non-metals on an outline of the periodic table</li> </ul>	<p>Use card atoms designed as jigsaw pieces that can fit together to show the differences between elements and compounds. (The cards could be coloured, eg carbon black, sulphur yellow.)</p> <p>Look at a pictorial periodic table. Look at actual elements themselves that are safe.</p> <p>Assemble a simple jigsaw of the two 'blocks' into an outline periodic table.</p> <p>CD ROM <i>Multimedia Science School – The periodic table (New Media)</i>.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>● explain how elements can be arranged in a periodic table</li> <li>● explain that elements near the bottom of the periodic table are heavier than those elements near the top of the table.</li> </ul> <p><b>Metals and non-metals</b> Students should be able to:</p> <ul style="list-style-type: none"> <li>● describe properties exhibited by most metals (solid, shiny, hard, and conduct heat and electricity)</li> <li>● describe some varied properties of non-metals, eg most do not conduct heat or electricity; many are gases</li> </ul> <ul style="list-style-type: none"> <li>● investigate how metals and non-metals conduct heat at different rates.</li> </ul> <p><b>Elements, compounds and mixtures</b> Students should be able to:</p> <ul style="list-style-type: none"> <li>● describe an element as a substance which cannot be separated into simpler substances</li> <li>● describe a compound as a substance made of elements which has properties different to those of the elements and which cannot easily be separated into them</li> </ul>	<p>Stick paper squares showing numbered elements onto a chart with numbered spaces.</p> <p>Make a large poster-size periodic table. Colour in the blocks and any other information you wish to add.</p> <p>Use the internet to research some uses of common metals and non-metals.</p> <p>Acting as a metal or non-metal, write a letter to a prospective employer asking for a job, eg copper wanting to be part of an electrical circuit. Explain what properties you have that would make you a suitable metal or non-metal for the job.</p> <p>Make a poster or leaflet to display some uses of these common properties.</p> <p>Carry out an experiment heating metal and non-metal rods, with pins stuck on with wax, to show some materials conduct better than others.</p> <p>Discuss how conductivity is applied at home, eg using a wooden spoon to stir your baked beans rather than a metal one.</p> <p>Class discussion of some everyday examples of elements, mixtures and compounds. List these. Poster display (make a leaflet advertising them – like the paint charts in DIY stores).</p> <p>Teacher presentation of some elements, compounds and mixtures. Students have to decide what they are (eg water = compound).</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• describe a mixture as being made from substances containing more than one type of element which can be separated into the elements which formed it</li> <li>• investigate methods of separation for different mixtures</li> <li>• investigate the properties of the elements iron and sulphur; a mixture of iron and sulphur; the compound iron sulphide</li> <li>• explain that a compound, iron sulphide, is produced when iron and sulphur react together (a chemical reaction)</li> <li>• investigate factors affecting the speed of reactions including temperature, surface area and concentration of reactants</li> <li>• explain that some reactions occur at different speeds.</li> </ul>	<p><i>RSC Classic Chemistry Experiments</i> (ISBN 0854049193) See page 2, No. 1 ‘Separating a sand and salt mixture’.</p> <p>Separate sandy water into its components. Give samples of mixtures and ask how they could be separated.</p> <p>Use appearance, a magnet, water (floating or sinking) and dilute acid to investigate properties of iron and sulphur; of a mixture of iron and sulphur; of iron sulphide.</p> <p><i>RSC Classic Chemistry Experiments</i> (ISBN 0854049193) See page 19, No. 8, ‘Iron in breakfast cereal’.</p> <p>NB: If the reaction is carried out, care is required due to production of sulphur dioxide.</p> <p><i>RSC Classic Chemistry Experiments</i> (ISBN 0854049193) See page 35, No. 14, ‘A compound from two elements’.</p> <p>Use card atoms to make particle pictures to show how iron sulphide is made. Use Velcro™ on the atoms to make them ‘combine chemically’.</p>

### Unit 5: What are Things Made From?

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• describe atoms, molecules and compounds in a simple way, eg using drawings</li><li>• make limited use of scientific terms (eg mixtures) in discussions</li><li>• make qualitative statements about experimental observations, eg for rates of reactions (speed of reaction is fast/slow) and state whether what happened was expected</li><li>• describe properties of groups of materials, eg metals and non-metals</li><li>• separate given materials using a specified method.</li></ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• describe atoms, molecules, compounds and mixtures using simple sentences</li><li>• make some use of scientific terms (eg atoms, molecules, compounds, periodic table) in discussions and written work</li><li>• record data, eg for rates of reactions accurately in a table, using the correct units. They can identify patterns in the data and draw simple conclusions from the patterns</li><li>• use the properties of materials to sort them into groups, eg, metals and non-metals</li><li>• identify and use a suitable method for separating given materials.</li></ul>

## Unit 6: Making Changes

While studying this unit, students will explore:

- physical and chemical changes
- hazard symbols
- metals in the Earth
- how to make and test some gases.

Students are expected to undertake practical work to achieve many of the outcomes for this unit. Students should make observations and draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. The use of ICT to present experimental work should be encouraged.

Knowledge, understanding and process skills	Suggested activities
<p>Physical and chemical changes</p> <p>Students should be able to:</p> <ul style="list-style-type: none"><li>• recall that there are two types of changes: physical change and chemical change</li><li>• investigate one example of a physical change (eg ice melting)</li><li>• explain that physical changes can be reversed</li><li>• investigate one example of a chemical change (eg rusting)</li><li>• explain that chemical reactions cause permanent changes</li><li>• give examples of materials that can be changed by chemical reactions into new substances with different properties</li></ul>	<p>Examples of physical changes to investigate include:</p> <ul style="list-style-type: none"><li>• melting and re-freezing of an ice cube (or jelly/chocolate)</li><li>• boiling water and collecting the condensation.</li></ul> <p>Practical work could include some everyday chemical changes, such as:</p> <ul style="list-style-type: none"><li>• making toast over a Bunsen burner</li><li>• heating an egg in a beaker</li><li>• making popcorn in a small beaker of oil.</li></ul> <p>Make a poster display of various examples and uses of chemical reactions (including cooking, burning fuels, etc).</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• describe some everyday examples of chemical reactions, eg               <ul style="list-style-type: none"> <li>– browning of an apple (involves oxygen from the air)</li> <li>– burning wood (test for carbon dioxide and water)</li> <li>– rusting of iron (involves oxygen and water) and its prevention (grease, oil, paint)</li> <li>– fibre-glass repair kits (powder/paste + hardener)</li> <li>– plaster of Paris; cement (hydration of water)</li> <li>– boiling an egg</li> </ul> </li> <li>• investigate the importance and costs of rusting (eg cars, bridges) and methods of preventing it</li> <li>• investigate the production of metal salts from neutralisation reactions, then flame test these metal salts to see their colour</li> <li>• explore some useful products that are derived from neutralisation reactions, eg, fireworks and fertilisers.</li> </ul> <p><b>Hazard symbols</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain why hazard symbols appear on chemical containers</li> <li>• explain that household products and substances in the laboratory can be dangerous to us</li> </ul>	<p>Investigate what turns fresh apples brown (use air; air and water; boiled water only; with apple slice in test tube).</p> <p>Use iron nails painted, covered in grease, etc.</p> <p>Demonstration of how some chemicals are dangerous (eg magnesium in acid – corrosive, ethanol in spirit burner – flammable).</p> <p>Show bottles of chemical and household products that have hazard symbols.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• draw the main hazard symbols: <ul style="list-style-type: none"> <li>– corrosive</li> <li>– flammable</li> <li>– toxic</li> <li>– explosive</li> <li>– radioactive</li> <li>– harmful/irritant</li> </ul> </li> <li>• describe the meaning of the following hazard symbols: <ul style="list-style-type: none"> <li>– corrosive</li> <li>– flammable</li> <li>– toxic</li> <li>– harmful</li> </ul> </li> <li>• investigate where these symbols can be found (at home, in the laboratory), what types of substances carry each of the symbols and what you should do if the substances are eaten or spilt.</li> </ul> <p><b>Metals in the Earth</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• recall that some metals are found as elements (eg gold) and some are found in compounds (ores) (eg iron oxide)</li> <li>• investigate where metals are found (in the UK/world) and why gold/silver/platinum are more expensive (they are rarer than other metals)</li> <li>• explain that metals found as compounds (ores) are harder to extract than to recycle, eg, aluminium.</li> </ul>	<p>Display a selection of containers that have these symbols on them.</p> <p>Look at samples (or pictures) of pure metals and ores to show the difference between them. Match the ores to the metal that can be extracted from it.</p> <p>Students could colour in a map to show where different materials are found.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Gases</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• recall that gases are produced by chemical changes that can show us that a reaction is happening, and how fast it is</li> <li>• describe how to make hydrogen gas</li> <li>• describe how to test for hydrogen gas</li> <li>• describe how to make oxygen gas</li> <li>• describe how to test for oxygen gas.</li> </ul>	<p>Note reaction of different metals with dilute acid to produce gas bubbles, showing that a gas is produced. The number of bubbles shows how fast the reaction is (more bubbles means a faster reaction).</p> <p>Collect the gas produced in a test tube when reacting magnesium and dilute hydrochloric acid. Test to show that this is hydrogen (squeaky pop test).</p> <p>Collect the gas produced when dilute hydrogen peroxide is reacted with manganese dioxide. Test to show that it is oxygen (relight glowing splint test). Caution: dilute hydrogen peroxide must be used and care must be taken when handling it – link this to hazard symbols.</p>

## Unit 6: Making Changes

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• give an example of a physical change, communicating their ideas in a simple way, eg, using drawings</li><li>• make limited use of scientific terms (eg reaction) in discussions</li><li>• use simple texts, with help, to obtain information, for example, about the importance and cost of rusting</li><li>• recognise hazard symbols</li><li>• describe how to test for hydrogen and carbon dioxide gases</li><li>• state the different coloured flames obtained when specified metals are placed in a Bunsen burner flame.</li></ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"><li>• give examples of some physical changes, communicating their ideas using simple sentences</li><li>• make some use of scientific terms (eg neutralisation reaction) in discussions and written work</li><li>• select information from sources that are provided to obtain information, for example, about the importance and cost of rusting</li><li>• suggest which hazard symbols should be placed on chemical storage containers, given details of the chemical hazards for each chemical</li><li>• identify hydrogen and carbon dioxide gases using appropriate tests</li><li>• identify metals using a simple flame test.</li></ul>

## Unit 7: There's One Earth

While studying this unit, students will explore:

- fuels
- pollution and the environment, including the greenhouse effect
- sources of useful chemicals
- sustainability.

Students should be encouraged to use ICT, eg, to produce a poster or leaflet to show the distillation of crude oil. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Fuels</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate the use of some common fuels (eg wood, petrol, charcoal) and fossil fuels (coal, crude oil and natural gas)</li> <li>• recall that in order to burn, a fuel needs heat energy and oxygen</li> <li>• explain that fire fighting involves removing one or more of fuel, heat energy or oxygen</li> <li>• discuss some methods of putting out fires (eg different types of fire extinguishers, fire blankets, sand) and which of the following they remove: fuel, heat energy or oxygen</li> <li>• describe what happens when a fuel burns, ie it reacts with oxygen in the air and gives out heat and light energy; this reaction is called combustion</li> </ul>	<p>Build a 'fire-triangle'.</p> <p>Visit the local fire station.</p> <p>Carry out a survey of extinguishers and fire blankets in school.</p> <p>Use pictures of various types of fires and link with the methods of putting them out.</p> <p>Collect information on various fuels (eg for a poster display).</p> <p>Discuss the best type of fuel for different situations, consider cost, storage, transport, etc.</p> <p>Compare various fuels (eg paper, wood, fire-lighter, cream cracker, and powdered coal).</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• describe the test for carbon dioxide and water</li> <li>• investigate the products produced when a fuel burns by testing for carbon dioxide gas and water</li> <li>• explain how this test shows that fuels contain carbon and hydrogen</li> <li>• recall the equation: fuel + oxygen → carbon dioxide + water</li> <li>• identify locations where oil is found (under land and sea)</li> <li>• recall that crude oil was formed over millions of years and explain why it is not a renewable resource</li> <li>• investigate how crude oil can be separated by distillation (a process called refining) into many useful substances: <ul style="list-style-type: none"> <li>– fuels (gas, petrol, diesel fuel)</li> <li>– substances which can be used to produce plastics, paints, drugs and dyes</li> <li>– building materials (eg bitumen for roads).</li> </ul> </li> </ul>	<p>Teacher demonstration of burning a fuel to produce products which:</p> <ul style="list-style-type: none"> <li>• turn limewater ‘milky’ (carbon dioxide)</li> <li>• turn dry white copper sulphate blue (water).</li> </ul> <p>Watch relevant videos (eg <i>Oil and Gas Formation</i> from BP Amoco) or use wall charts or CD ROM resources.</p> <p>Do a cut-and-paste picture puzzle on the stages of the formation and production of oil.</p> <p>Useful website addresses: <a href="http://www.shell.co.uk">www.shell.co.uk</a>; <a href="http://www.esso.co.uk">www.esso.co.uk</a>; <a href="http://www.bpes.com">www.bpes.com</a></p> <p>Basic demonstration of distillation of two liquids.</p> <p>Make a model fractionating tower from a large plastic drinks bottle. Put on sticky labels to show the various temperatures and products at each level.</p> <p>Use the internet to collect information on the materials that can be made from crude oil. Produce a leaflet on these materials using a word processor and graphics package.</p> <p>Demonstrate distillation of substitute ‘crude oil’; use ‘made-up’ crude oil, in a fume cupboard, using a recipe from CLEAPSS Hazcards or from <i>Teaching Secondary Chemistry</i>, John Murray Publications (ISBN 0719576385). Do not use crude oil, which is carcinogenic.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Environment</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain that pollutants are substances or forms of energy (heat, noise, radiation) that may harm living things and the environment</li> <li>• investigate the damaging effects that harmful waste products (eg carbon dioxide, acidic gases and smoke) have on the environment when fossil fuels are burned</li> <li>• explain that too much carbon dioxide in the Earth's atmosphere can cause global warming</li> <li>• explore how global warming can cause damage to the Earth (eg the melting of polar ice caps causes sea levels to rise, droughts)</li> <li>• describe how the composition and temperature of the Earth's atmosphere have altered over time</li> <li>• explain why bio-fuels are sometimes used as alternatives to fossil fuels</li> <li>• investigate how recycling certain materials (glass, metal and papers) uses less energy and produces less pollution than making more of these materials</li> </ul>	<p>Class discussion.</p> <p>Debate the use of fossil fuels and nuclear fuels. Students should present the advantages and disadvantages of each and vote on the outcome. (This is an opportunity for students to draw posters, use the Internet for research, use oral communication skills and teamwork to gather their evidence and arguments.)</p> <p>Design a board game on energy or pollution.</p> <p>Investigate the possible effects of global warming. Use the internet for research and films (eg <i>The Day After Tomorrow</i>) for public ideas of global warming.</p> <p>Investigate the uses of bio-fuels using the internet (eg Brazil using alcohol in cars rather than petrol).</p> <p>Investigate what substances are recycled by your local council and your school (use internet sites for local councils). Possibly visit a local land disposal site/recycling plant.</p> <p>Design a poster to encourage people to recycle more glass, metal and papers.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• explain that rock salt and sea water are alternative sources of useful chemicals:               <ul style="list-style-type: none"> <li>– sodium</li> <li>– chlorine</li> <li>– sodium chloride</li> <li>– hydrogen</li> <li>– sodium hydroxide.</li> </ul> </li> </ul>	<p>Investigate uses of sodium chloride, hydrogen, sodium and chlorine.</p> <p>The use of salt in cooking. <i>RSC Kitchen Chemistry</i> (ISBN 0854043896).  <a href="http://www.chemsoc.org/kitchenchemistry">www.chemsoc.org/kitchenchemistry</a>.</p>

## Unit 7: There's One Earth

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• describe global warming in a simple way, eg using drawings or a poster</li> <li>• make limited use of simple scientific terms (eg fuel) in discussions</li> <li>• describe how to test for water and carbon dioxide gas</li> <li>• use simple texts, with help, to obtain information about recycling materials, for example</li> <li>• discuss the pollution produced by burning fossil fuels and the harm caused to the environment in a general context.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• describe global warming using simple sentences (perhaps within a leaflet) and outline its impact on the environment</li> <li>• make some use of scientific terms (eg fossil fuels, bio-fuels) in discussions and written work</li> <li>• identify the products formed when a fuel is burned using appropriate tests</li> <li>• select information from sources that are provided to obtain information about recycling materials, for example</li> <li>• discuss the impact on the environment of the different pollutants produced by burning fossil fuels.</li> </ul>

## Unit 8: Properties of Materials and their Uses

While studying this unit, students will explore:

- the properties of different materials
- applications of different materials
- implications of the degradability of materials.

Many outcomes for this unit may be achieved using ICT, eg word processors and presentation, desktop publishing and graphics packages. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Natural and synthetic materials</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• classify materials as metals, ceramics, glass, plastics or fibres</li> <li>• identify some common examples of these groups, eg:               <ul style="list-style-type: none"> <li>– metals: cans</li> <li>– ceramics: plates</li> <li>– glass: windows</li> <li>– plastics: buckets</li> <li>– fibres: clothing</li> </ul> </li> <li>• describe the properties of materials in these five groups that make them useful</li> <li>• investigate the properties of familiar objects and materials, eg, colour, shape, texture, transparency, hardness, flexibility (bending, stretching), magnetism</li> </ul>	<p>Recognise and label some examples (eg iron, glass, plastic, wool, brick, nylon, pottery).</p> <p>Use ‘playing cards’ with objects listed above as ‘happy families’ to sort into groups.</p> <p>Sort objects on a tray in various ways.</p> <p>Stick labels on items in the classroom which are made from/contain similar materials. Test some materials for texture, hardness, lustre (shininess), flexibility, sinking/floating, and conduction of heat.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• explore materials that occur naturally (eg wool from sheep, cotton from plants) and materials that are made from naturally occurring materials (eg plastic from oil, bricks from clay); these are synthetic (made) materials</li> <li>• investigate materials that have been made to have specific properties for specific purposes (eg glue on Post-it notes™)</li> <li>• relate the properties of a material to its possible uses in clothing and sport (eg Thinsulate™ in ski jackets, carbon fibres in fishing rods)</li> <li>• recall that plastics can be produced from chemicals extracted from crude oil</li> <li>• investigate some of the advantages and disadvantages of plastics: <ul style="list-style-type: none"> <li>– advantages: light, often cheap, can be coloured and made into various shapes, do not rust or rot, waterproof</li> <li>– disadvantages: often flammable, with dangerous fumes, most not biodegradable</li> </ul> </li> <li>• investigate different types of plastics and their properties.</li> </ul>	<p>Make a collage (or poster) of materials to show which are natural and which are synthetic.</p> <p>Make lists of the two types found in everyday life. Make a card game like 'pairs'.</p> <p>Make a collage/poster on sports equipment showing how the properties of materials influence their use. (Use leaflets, adverts, etc.)</p> <p>Devise and carry out tests to compare different brands for the best properties for use (eg best paper towel, carrier bag and elastic band).</p> <p>Design a kitchen or racing car. List the materials used and get students to say what property each material has to enable it to be used for a particular job. Students could use ICT or produce a leaflet or poster to present their models.</p> <p>Find out some properties of plastics and relate their advantages and disadvantages to their uses.</p> <p>A useful resource covering a range of topics relating to plastics is: <i>Recycling Cities in the Making Use of Science and Technology</i> series (ISBN 1853425157).</p> <p>Collect samples of objects made from different plastics and try to link their properties to their uses.</p> <p>Design a plastic toy or storage box, for example, and say what properties the plastic needs to make it suitable for its particular function.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Food and drink</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore how food is kept fresh by using different types of packaging</li> <li>• describe the properties of packaging used to keep food fresh</li> <li>• investigate how beer and wine can be made by fermentation reactions using yeast to convert the sugar to alcohol.</li> </ul> <p><b>Designing materials</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• describe how materials are designed for specific purposes</li> <li>• identify the properties required of a material for particular applications, eg, properties needed for a drinks container.</li> </ul>	<p>Look at different types of food packaging and which foods are packaged in similar ways.</p> <p>Demonstration (or practical) of fermentation reactions (this may take a few days).</p> <p>Get students to list desired properties that a material needs to have to be suitable for a particular product.</p>

## Unit 8: Properties of Materials and their Uses

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• identify metals, ceramics, glass, plastic and fibres using an identification chart</li> <li>• make limited use of scientific terms (eg bending, stretching) to describe properties of materials</li> <li>• use simple texts, with help, to obtain information, eg, to relate the properties of a material to its possible uses</li> <li>• describe the advantages and disadvantages of plastics, communicating their ideas in a simple way, eg, using drawings</li> <li>• list properties of materials</li> <li>• discuss how different types of packaging keep food fresh in a general context.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• describe the properties of metals, ceramics, glass, plastic and fibres and identify samples of these materials without the aid of an identification chart</li> <li>• make some use of scientific terms (flexibility, transparency, texture) to describe properties of materials</li> <li>• select information from sources that are provided to obtain information, eg, to relate the properties of a material to its possible uses</li> <li>• describe the advantages and disadvantages of plastics, communicating their ideas using simple sentences</li> <li>• explain why the properties of materials make them suitable for use in particular applications</li> <li>• identify appropriate materials for specified applications from their properties</li> <li>• discuss how different types of packaging keep food fresh in specific contexts.</li> </ul>

## Unit 9: Electricity: its Production and its Applications

While studying this unit, students will explore:

- simple electric circuits
- the generation and costing of electricity
- the heating effect of electricity and its impact on the environment
- electrical safety and the uses of electricity.

Students are expected to obtain practical experience of building simple circuits and using meters to enable them to collect data for testing simple ideas and to draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols. Students should be encouraged to use ICT to produce posters and leaflets and to present their experimental work.

Knowledge, understanding and process skills	Suggested activities
<p><b>Units and cost of electricity</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• use the following terms and units (if tested, formula will be supplied):               <ul style="list-style-type: none"> <li>– voltage – volt (V)</li> <li>– current – ampere (A)</li> <li>– power – watt (W)</li> <li>– resistance – ohms</li> </ul> </li> <li>• explain that the amount of electricity used by an electrical appliance in a given time depends on the power rating; the bigger the power rating, the more electricity is used</li> <li>• investigate the cost of electricity for using different appliances in the home given formula and data.</li> </ul>	<p>Look at some electrical appliances and list their power, voltage and current (where given) ratings with units.</p> <p>Using a drawing package or a presentation package to produce a poster or a leaflet, group the appliances into high- and low-power appliances.</p> <p>Relate to appliances identified above and appliances used at home.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Sources of electricity</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• identify which electrical items used in the classroom and at home are powered by mains electricity or by batteries</li> <li>• describe the difference between alternating current (ac) and direct current (dc) in terms of the direction of current</li> <li>• identify and explore sources of alternating current (ac) and direct current (dc) including: <ul style="list-style-type: none"> <li>– mains supply</li> <li>– batteries (rechargeable and non-rechargeable)</li> <li>– solar cells</li> <li>– wind turbines</li> </ul> </li> <li>• explore the advantages and disadvantages of different sources of electrical energy, including their impact on our environment</li> <li>• explore the link between the use of mains electricity and burning coal, oil and gas</li> <li>• explore applications of solar cells, eg lights in garden, calculators</li> </ul>	<p>Make a collage of electrical equipment using pictures from magazines and newspapers.</p> <p>If available, use an oscilloscope to demonstrate ac and dc and show the effect of swapping the terminals on the battery or cell.</p> <p>Demonstrate that an alternating current constantly changes direction.</p> <p>Use a word processor or publishing package to produce a leaflet that illustrates different sources of electrical energy, and their advantages and disadvantages, including their impact on our environment.</p> <p>Use a graphics package to produce a poster showing applications of solar cells.</p> <p>Demonstrate a solar cell. Use a filter to simulate the effect of clouds.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>describe how to produce an electric current by rotating a magnet in a coil of wire.</li> </ul> <p><b>Circuits</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>interpret simple circuit diagrams</li> <li>investigate the effect of changing the number of lamps in a circuit on the current flowing in the circuit</li> <li>investigate currents and voltages in series and parallel circuits using ammeters and voltmeters</li> <li>investigate the effect of a resistor on the current flowing in a circuit.</li> </ul> <p><b>Heating effect of electricity – applications and implications</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>explain that an electric lamp works by an electric current heating up a wire (filament) until it glows</li> </ul>	<p>Demonstrate a simple dynamo.</p> <p>Discuss ‘wind-up’ electrical devices that do not need a battery to operate.</p> <p>Watch a video to show how electricity is produced, eg <i>Science In Focus – Physical Processes 2: Electric City</i>.</p> <p>Using a series circuit, vary the number of lamps and identify the effect on the current in the lamps and their brightness.</p> <p>Using a parallel circuit, note the effect on the current when more lamps are added.</p> <p>Students could work in pairs. Digital meters are preferred, although moving coil meters are acceptable.</p> <p>Use graphite pencils as resistors to see the effect of resistance on the brightness of a light bulb and the electric current flowing in the circuit.</p> <p>Discuss how light bulbs heat up – when you change a bulb it is hot.</p> <p>Demonstrate the use of energy-saving, long-life bulbs compared with filament light bulbs.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• describe how the heating effect of an electric current is used in: <ul style="list-style-type: none"> <li>– electric bar heaters – grills</li> <li>– convection heaters – kettles, cookers</li> </ul> </li> <li>• investigate the unwanted heating effects caused by electricity that can waste money and affect the environment.</li> </ul> <p><b>Electrical safety</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explain that the mains supply can provide dangerous currents which can cause serious injury or death to users</li> <li>• explain the functions of the: <ul style="list-style-type: none"> <li>– live wire – energy flows along it</li> <li>– neutral wire – needed to make a complete circuit</li> <li>– earth wire – is for safety, acting with the fuse to protect the user from being electrocuted</li> </ul> </li> <li>• explain how a fuse protects the appliance and its connecting wires from damage if too large a current passes</li> <li>• explain that other dangers include poor insulation, damaged wiring loose wires and moisture</li> <li>• explain why some rooms in a house (eg bathroom) should not have power outlets or ordinary sockets.</li> </ul>	<p>Look at examples of these appliances and discuss how they work.</p> <p>Discuss electricity used by TVs/VCRs when left on stand-by and why manufacturers are developing components that reduce losses caused by thermal energy.</p> <p>Invite your local electricity board in to deliver a talk about electricity and safety (eg Yorkshire Electricity shows a video called ‘<i>Electric Graffiti</i>’).</p> <p>Have some examples, or diagrams, of plugs, that are incorrectly wired or have some other fault.</p> <p><b>NB: Care is needed to ensure that students do not put the faulty plugs in sockets.</b></p> <p>Students could be asked to complete a summary chart identifying what is wrong with each plug they look at.</p> <p>Demonstration – show that a wire will melt if the current flowing through it becomes too high.</p> <p>Use a range of appliances to illustrate the appropriate use of 13A and 3A fuses.</p> <p>Produce a ‘Safety In The Home’ booklet using a word processor and drawing package.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Uses of electricity</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore some uses of electricity and their implications for the world, eg electric telephone, digital cameras, computers.</li> </ul>	<p>Use the internet to research uses of electricity and produce a poster or a presentation to summarise the research.</p>

## Unit 9: Electricity: its Production and its Applications

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples of some situations in which electricity affects our everyday lives, communicating their ideas in a simple way, eg, using drawings</li> <li>• make limited use of scientific terms (eg power and current) in discussions</li> <li>• use simple circuits to make qualitative observations</li> <li>• make qualitative statements about readings on meters (eg high/low) and components in circuits (eg bulb is bright/dim) and state whether what happened was expected</li> <li>• enter numbers into a spreadsheet that automatically calculates and displays a result</li> <li>• discuss the heating effect of electricity in a general context</li> <li>• identify the dangers of electricity and outline ways in which the user may be protected</li> <li>• use simple texts, with help, to obtain information about the unwanted heating effects caused by electricity.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples advantages and disadvantages of applications of electricity in our everyday lives, communicating their ideas using simple sentences</li> <li>• make some use of scientific terms (eg power, current, voltage and resistance) in discussions and written work</li> <li>• build electric circuits from a circuit diagram</li> <li>• accurately record readings from meters in a table, using the correct units. They can identify patterns in the data and draw simple conclusions from these patterns</li> <li>• substitute numbers into a simple formula and use a calculator to complete a calculation</li> <li>• discuss the heating effect of electricity in specific contexts</li> <li>• discuss the dangers of electricity and how they may be reduced</li> <li>• select information from sources that are provided to obtain information about the unwanted heating effects caused by electricity.</li> </ul>

## Unit 10: Energy to Make Things Work

While studying this unit, students will explore:

- the uses of different types of energy
- different types of energy resources and their social and economic benefits
- the implications of sustainable development and future fuels
- energy transfer.

Students are expected to undertake practical work in order to achieve some of the outcomes for this unit. They should have the opportunity to collect data to test simple ideas and to draw conclusions using appropriate scientific, technical and mathematical language, conventions and symbols (eg exploring the effects of thermally insulating materials). Students should be encouraged to use ICT to present their work; they may use spreadsheets to tabulate data they have obtained and produce graphs where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>What is energy?</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore different forms of energy and give examples of where they are used in modern life</li> <li>• investigate situations where energy is needed to make something happen.</li> </ul> <p><b>Energy resources</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate the sun as the main source of energy for the Earth, eg facilitates wind power, contributes to tidal power, provides thermal energy, drives solar cells</li> </ul>	<p>Use a drawing package to produce a poster illustrating different forms of energy.</p> <p>Make a circus of activities to show how energy is needed and its many different forms, eg wind-up toy, chocolate bar, elastic band, hair dryer, torch, radio.</p> <p>Use the internet to find out about these energy resources.</p> <p>Use a drawing package to produce a poster to illustrate the importance of the sun as a source of energy.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• explore energy resources that: <ul style="list-style-type: none"> <li>– will not run out (hydro, wind, solar, bio-mass, geothermal, tidal, wave)</li> <li>– will run out (oil, coal, gas, nuclear)</li> </ul> </li> <li>• compare the advantages and disadvantages of energy resources that will run out with those that will not run out</li> <li>• describe how oil, coal and gas are found in large amounts underground, and how they are formed from dead animals or plants compressed over a long period of time</li> <li>• explore changes of energy resources that are likely to occur during this century.</li> </ul> <p><b>Energy transformation</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate situations that involve the transformation of energy (eg heat [thermal], light, sound, movement [kinetic], electricity) from one form into another</li> <li>• investigate the efficiency of transforming energy from one form into another.</li> </ul>	<p>Produce a poster or leaflet using ICT packages to illustrate advantages and disadvantages of different energy sources.</p> <p>Make models, posters and booklets on different energy resources.</p> <p>Give group presentations on how coal, oil and gas are formed.</p> <p>Collect information on what changes are likely to occur during this century.</p> <p>Construct energy chains (eg electricity → heat and light in an electric lamp).</p> <p>Use the previous circus of activities to show how energy is transformed from one form to another.</p> <p>Shine the light from a desk lamp containing an energy-efficient bulb onto a thermometer for at least five minutes. Repeat using a filament bulb (the thermometer should be the same distance from the lamp as previously). Compare the rise in temperature of the thermometer in each case. Discuss the link between the rise in temperature and the power rating of the bulbs.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Energy transfer</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>recall that temperature is a measure of how hot or cold an object is</li> <li>describe situations in which a difference in temperature leads to a transfer of energy from a hot object to a colder one, eg, the Sun/Earth; indoors/outdoors on a cold winter's day</li> <li>investigate the ability of different substances to allow thermal energy to flow through them easily (conductors of heat) while others do not (insulators)</li> <li>investigate the use of insulation to reduce the transfer of energy between objects at different temperatures.</li> </ul> <p><b>Applications of energy</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>describe uses of energy which are important in the home, office and industry and give some examples (heating, lighting, movement, entertainment, etc)</li> </ul>	<p>Construct a temperature scale showing the relative temperatures of everyday objects (eg ice, room, hot drink).</p> <p>Give a demonstration using three bowls of water – one student puts hand in cold water, one student puts hand in warm water, both then put hand in the same bowl of lukewarm water. Discuss why one says it is warm and one says it is cold.</p> <p>Teacher demonstration: heating one end of a metal rod/glass rod. Fix drawing pins to the end of the rods with Vaseline™. Discuss why the pins fall off (because the rod conducts heat and melts the Vaseline™).</p> <p>Challenge: use different materials to keep a beaker of hot water warm for as long as possible and measure the drop in temperature over a period of time.</p> <p>Have a class discussion and/or produce poster displays for energy applications and their efficiency: fires, electric fires, central heating, furnaces, heaters, boilers, electric lamps, fluorescent tubes, washing machines, vacuum cleaner, transport, motors, drilling, radio, TV, computer games, CD and hi-fi.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• explain that reducing energy losses is important to keep costs down and to save energy resources</li> <li>• explore some methods of reducing energy losses: double glazing, cavity wall insulation, loft insulation, lagging of tanks and pipes, draught excluders, furnishings</li> <li>• explore how our use of energy affects the environment.</li> </ul>	<p>Look at the school and/or home environment to find where energy is being used, wasted or saved, eg roof, walls, windows and doors.</p> <p>Students could use a presentation package to do group presentations or use a publishing package (or a word processor and graphics package) to produce a leaflet or poster to show how our use of energy affects the environment.</p>

## Unit 10: Energy to Make Things Work

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples of some situations in which the use of energy affects the environment, communicating their ideas in a simple way, eg using drawings</li> <li>• make limited use of scientific terms (eg energy, temperature) in discussions</li> <li>• investigate, with help, the ability of different substances to allow thermal energy to pass through them</li> <li>• make qualitative statements about temperature measurements (eg the temperature went up/down, it took a short/long while for the temperature to go up/down) and state whether what happened was expected</li> <li>• discuss how to reduce energy losses in a general context</li> <li>• use simple texts, with help, to obtain information about energy resources</li> <li>• give simple examples of situations in which energy is transformed.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• give examples of situations in which the use of energy affects the environment, describing the impact on the environment using simple sentences</li> <li>• make some use of scientific terms (eg energy, transformation, efficiency, temperature) in discussions and written work</li> <li>• investigate, with little, if any, help the ability of different substances to allow thermal energy to pass through them</li> <li>• record readings from thermometers accurately in a table, using the correct units. They can identify patterns in the data and draw simple conclusions from these patterns</li> <li>• discuss how to reduce energy losses in specific contexts</li> <li>• select information from sources that are provided to obtain information about energy resources</li> <li>• give examples of situations in which energy needs to be transformed, identifying the cause of any inefficiencies in the process.</li> </ul>

## Unit 11: Electromagnetic Waves and their Uses

While studying this unit, students will explore:

- the uses and properties of waves
- reflection (including total internal reflection) of light
- applications of waves and their implications, and associated ethical/moral issues
- optical instruments.

It is expected that most of the outcomes for this unit will be achieved via practical work. Students should be encouraged to draw conclusions from their data and use appropriate scientific, technical and mathematical language, conventions and symbols. As ICT contributes to how science works, students should be encouraged to use ICT facilities; for example, they can use a word processor to write up experiments and produce booklets; spreadsheets may be used to tabulate data obtained by students and produce graphs where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Wave energy</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate applications that rely on the use of waves to transfer energy from one place to another, eg hi-fi systems, microwave ovens and mobile phones, including a consideration of environmental, moral and ethical issues.</li> </ul> <p><b>Reflection of light</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate how plane mirrors               <ul style="list-style-type: none"> <li>– change the direction of light</li> <li>– produce images</li> </ul> </li> </ul>	<p>Demonstrate waves using a Slinky.</p> <p>Produce a poster to show applications that depend on the transfer of wave energy from one place to another.</p> <p>Extend to measuring the angle of incidence and reflection.</p> <p>Build a kaleidoscope.</p> <p>Use a mirror to look at reverse reflections.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>● recall that our images in plane mirrors are: <ul style="list-style-type: none"> <li>– the same size</li> <li>– the same way up</li> </ul> </li> <li>● draw a ray diagram to show the formation of the virtual image in a plane mirror.</li> </ul> <p><b>Total internal reflection</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>● investigate total internal reflection of light in a prism at one edge and at two edges</li> <li>● explore applications of total internal reflection, including optic fibre cables</li> <li>● draw ray diagrams to show how these applications work</li> <li>● draw a ray diagram to show how total internal reflection enables light to travel along bent fibre optic cables</li> <li>● explore applications of fibre optic cables (eg communications – cable TV; medical uses – endoscopes).</li> </ul> <p><b>Optical instruments</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>● investigate how an image is formed in a pinhole camera</li> <li>● draw a ray diagram to show how an image is formed in a pinhole camera</li> <li>● state that the image in a pinhole camera is upside down</li> </ul>	<p>Mirror writing.</p> <p>Investigate total internal reflection in a prism.</p> <p>Applications may include bicycle light reflectors and prisms used in some greenhouses to increase the amount of sunlight entering the greenhouse. Students could examine a reflecting bicycle light and see a demonstration of a model greenhouse.</p> <p>View the light from a bundle of fibre optic fibres placed on an OHP.</p> <p>Build a pinhole camera.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• investigate the formation of the real image produced by a converging lens</li> <li>• explain why a camera needs a lens</li> <li>• draw a ray diagram to show how a converging lens produces an image on the film in a camera</li> <li>• measure the focal length of a converging lens</li> <li>• build a simple telescope using two converging lenses</li> <li>• draw a simple ray diagram to show how an image is formed in their telescope</li> <li>• use a ray diagram to explain how a converging lens can correct the problem of long sight.</li> </ul> <p><b>Other waves</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore how the following waves may be used in communications: <ul style="list-style-type: none"> <li>– radio waves</li> <li>– microwaves (mobile phones, satellite TV)</li> <li>– visible light waves (fibre optics)</li> </ul> </li> </ul>	<p>Build a model camera to show how the lens forms an image.</p> <p>Build a telescope using two converging lenses. <b>Caution: students should not look at bright lights (eg the sun) using their telescope.</b></p> <p>Demonstration: model eye and a corrective converging lens.</p> <p>Use the internet to research the properties and the uses of waves in communications.</p> <p>Use a graphics package to produce a poster or leaflet about the uses of waves in communications.</p>

Knowledge, understanding and process skills	Suggested activities
<ul style="list-style-type: none"> <li>• describe applications of the following ionising radiations:               <ul style="list-style-type: none"> <li>– X-rays (detecting bone fractures, chest diseases, cancer treatment)</li> <li>– gamma rays (tracers, sterilising equipment)</li> </ul> </li> <li>• discuss ethical and environmental issues involving these applications</li> <li>• state that all the above waves belong to the electromagnetic spectrum.</li> </ul>	<p>Use the internet to research the uses of x-rays and gamma rays.</p> <p>Use an ICT package to produce a short presentation on the uses of ionising radiations.</p> <p>Use <b>Grandma X's Umbrella Vanishes In Mild Rain</b> to remember the order of the parts of the electromagnetic spectrum (<b>Gamma, X-rays, Ultra-violet, Visible, Infrared, Microwaves, Radio waves</b>).</p> <p>Produce a poster to show the different parts of the electromagnetic spectrum.</p>

## Unit 11: Electromagnetic Waves and their Uses

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• show a basic understanding of how optical instruments work, communicating their ideas in a simple way, eg using drawings</li> <li>• make limited use of scientific terms (eg reflection) in discussions</li> <li>• use simple optical equipment with help</li> <li>• make qualitative statements about experimental outcomes (eg lens A has a larger focal length than lens B)</li> <li>• discuss properties of waves in a general context</li> <li>• use simple texts, with help, to obtain information about applications of waves and ionising radiations.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• show an understanding of how optical instruments work, communicating their ideas using simple sentences</li> <li>• make some use of scientific terms (eg reflection, total internal reflection, refraction, focal point) in discussions and written work</li> <li>• use simple optical equipment with little, if any, help</li> <li>• make quantitative conclusions about experimental outcomes (eg state the value of the focal length of a lens)</li> <li>• discuss properties of waves in a specific context</li> <li>• select information from sources that are provided to obtain information about applications of waves and ionising radiations.</li> </ul>

## Unit 12: Exploring the Earth and Space

While studying this unit, students will explore:

- how we obtain information about the universe
- the social and economic benefits of exploring space and the technological advances that this brings
- conditions in space and space travel
- volcanoes and earthquakes and their effects.

This unit also provides an opportunity to look at how ideas on the solar system and our understanding of it have changed over time. As ICT contributes to how science works, students should be encouraged to use ICT facilities; for example, a word processor may be used to produce booklets/leaflets on how we explore space. Students should use scientific, technical and mathematical language, conventions and symbols where appropriate.

Knowledge, understanding and process skills	Suggested activities
<p><b>Exploring space from the Earth</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore different ways of how we find out information about our universe, including the use of optical telescopes and their limitations</li> <li>• investigate how astronomical observations have changed our ideas of the solar system over time</li> <li>• use secondary data to compile a fact sheet on our solar system</li> <li>• discuss the social and economic benefits that may be derived from exploring the universe and the technological advances which may be derived from exploring space.</li> </ul>	<p>Use a word processor and graphics package to produce a leaflet to illustrate the different methods used to explore the universe.</p> <p>Benefits that can be discussed include new thermally insulating materials for the home, smoke alarms and cordless power tools. See <a href="http://techtran.msfc.nasa.gov/at_home.html">http://techtran.msfc.nasa.gov/at_home.html</a> for more ideas.</p> <p>Involve students in a discussion such as ‘Should we send astronauts to Mars?’</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Space travel and living in space</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• describe conditions in interplanetary space, including: <ul style="list-style-type: none"> <li>– lack of atmosphere</li> <li>– temperature</li> <li>– weightlessness</li> </ul> </li> <li>• discuss the equipment/resources needed to survive a space journey, eg <ul style="list-style-type: none"> <li>– air supply</li> <li>– heating/cooling systems</li> <li>– food</li> <li>– space suits</li> </ul> </li> <li>• describe the problems associated with long-term space flight, including: <ul style="list-style-type: none"> <li>– radiation</li> <li>– effect on bones</li> <li>– effect on the heart</li> </ul> </li> <li>• use secondary data sources to find out about the conditions on one of the planets (not Earth!) in our solar system: <ul style="list-style-type: none"> <li>– describe what it would be like to live there, and consider the equipment needed for survival.</li> </ul> </li> </ul>	<p><a href="http://spaceflight.nasa.gov/living/index.html">http://spaceflight.nasa.gov/living/index.html</a> may provide some useful ideas.</p> <p><a href="http://spaceflight.nasa.gov/living/index.html">http://spaceflight.nasa.gov/living/index.html</a> has information on living in space.</p> <p>Students could work in small groups or pairs to consider the equipment needed.</p> <p>As an introduction, show a suitable video or DVD, eg BBC DVD <i>The Planets</i></p> <p>The Nine Planets website (<a href="http://www.ex.ac.uk/Mirrors/nineplanets">www.ex.ac.uk/Mirrors/nineplanets</a>) also has useful information and links to other relevant sites.</p> <p>Produce a leaflet about living on one of the planets in our solar system.</p>

Knowledge, understanding and process skills	Suggested activities
<p><b>Structure of the Earth</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• explore the three main parts of the Earth's structure, ie a core of very hot, partly molten rock; a mantle of hot molten rock; and a 'thin' crust of solid rock.</li> </ul> <p><b>Earthquakes and volcanoes</b></p> <p>Students should be able to:</p> <ul style="list-style-type: none"> <li>• investigate the cause of volcanoes and earthquakes (volcanoes are caused by movements and cracks in the Earth's crust, which allow hot molten rock and gases to escape from the mantle to the surface; these movements can also cause earthquakes)</li> <li>• discuss the effects of volcanic activity on the environment and on the people who live nearby</li> <li>• recall that scientists cannot predict when earthquakes will occur and that some scientists are working towards achieving this aim</li> <li>• draw and label an outline diagram of a volcano to include cone, crater, magma chamber, magma, lava and ash</li> <li>• investigate how the shape of land on Earth has changed over time.</li> </ul>	<p>Compare/contrast the structure of Earth with other structures (eg a peach or hard-boiled egg).</p> <p>Draw and label a diagram of the structure of Earth.</p> <p>Demonstrate, or get students to build, a model volcano (wax, sand, water).</p> <p>Look at pictures and videos of volcanoes. Collect information on volcanoes and earthquakes and their effects.</p> <p>Colour in areas of earthquake and volcanic activity on a world map.</p> <p>Review media coverage of any recent volcanic activities.</p> <p>Use a world map and make a jigsaw to show how the land could once have been whole.</p>

## Unit 12: Exploring the Earth and Space

The following table provides some examples that distinguish between an Entry Level 1 and Entry Level 3 student performances for this topic.

Entry Level 1	Entry Level 3
<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• use secondary data sources with help to, for example, produce a fact sheet on the solar system</li> <li>• make limited use of scientific terms (eg planet, volcano) in discussions</li> <li>• describe how our understanding of the solar system has changed over time</li> <li>• use simple texts, with help, to obtain information, for example about conditions on other planets</li> <li>• show a basic understanding of, for example, the causes of earthquakes, communicating their ideas in a simple way, eg using drawings</li> <li>• discuss the social and economic benefits of exploring space in a general context.</li> </ul>	<p>Students at this level are likely to be able to:</p> <ul style="list-style-type: none"> <li>• use secondary data sources with little, if any, help to, for example, produce a fact sheet on the solar system</li> <li>• make some use of scientific terms (eg solar system, magma, mantle) in discussions and written work</li> <li>• describe how our understanding of the solar system has changed over time, outlining scientific evidence for developments in our understanding</li> <li>• select information from sources that are provided to obtain information, for example about conditions on other planets</li> <li>• show an understanding of, for example, the causes of earthquakes, communicating their ideas using simple sentences</li> <li>• discuss the social and economic benefits of exploring space in a specific context.</li> </ul>

## Specimen assessments

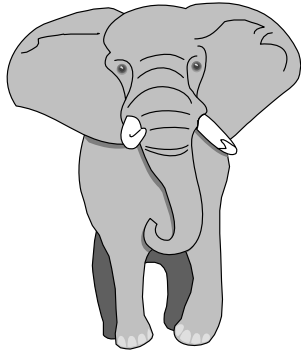
---

Specimen test: Unit 1: Survival in Nature	69
Specimen test mark scheme: Unit 1: Survival in Nature	73
Specimen assignment: Unit 2: Cells, DNA and Diseases	74
Specimen assignment mark scheme: Unit 2: Cells, DNA and Diseases	77
Specimen test: Unit 7: There's One Earth	78
Specimen test mark scheme: Unit 7: There's One Earth	82
Specimen assignment: Unit 7: There's One Earth	84
Specimen assignment mark scheme: Unit 7: There's One Earth	87
Specimen test: Unit 9: Electricity: its Production and its Applications	88
Specimen test mark scheme: Unit 9: Electricity: its Production and its Applications	93

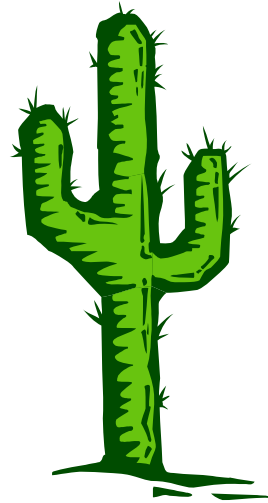


# Specimen test: Unit 1: Survival in Nature

## Questions 1 to 3



An African elephant lives in the African desert.



A cactus lives in the American desert.

The African elephant and the cactus are both very well adapted to the habitats in which they live.

1 Name **one** characteristic of the African elephant that helps it survive in the African desert.

.....  
.....

(1)

2 Name **one** characteristic of the cactus that helps it survive in the American desert.

.....  
.....

(1)

3 State the reason the characteristic you have chosen helps the cactus survive in the desert.

.....  
.....

(1)

Questions 4 to 5

Aaron says:



Power stations burn fossil fuels.  
When these fossil fuels are burned they make gases which pollute the atmosphere.  
These gases harm the environment.

4 Name **one** gas that pollutes the environment when fossil fuels are burned by the power stations.

.....  
.....

(1)

5 Give **two** other human activities that can pollute the environment.

.....  
.....  
.....  
.....  
.....

(2)

**Questions 6 to 8**

Aaron's school has decided to introduce a new recycling system.

Aaron wants to explain the system to the other students. He will use questions 6, 7 and 8 to help him explain the system.

The following materials can be recycled:

cardboard   aluminium drink cans   lettuce leaves   pieces of wood
--

Choose from the materials in the box above to answer questions 6, 7 and 8.

6 Which of these materials does not decay?

.....  
(1)

7 Which of these materials takes the longest time to decay?

.....  
(1)

8 Which of these materials takes the shortest time to decay?

.....  
(1)

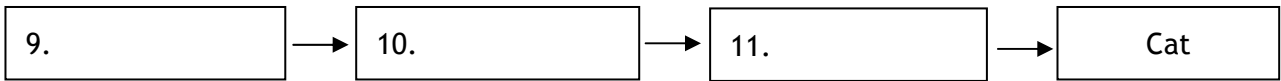
**Question 9 to 11**

In Aaron's garden a thrush eats a snail.

The snail ate a lettuce leaf.

The thrush was nearly caught by his neighbour's cat.

Complete the possible food chain for these events.



(3)

**Questions 12 to 14**

Use some of the words in the box to answer questions 13 to 15.

consumers    microbes    predators    producers
---

12 Green plants are called ..... because they make their own food using light.

(1)

13 Animals cannot make their own food. Many animals eat plants. They are called

.....

(1)

14 Dead animals and plants decay with the help of .....

(1)

**Total marks 15**

## Specimen test mark scheme: Unit 1: Survival in Nature

- 1 Tusks/trunk/big ears. (1)
- 2 Long roots/spines/no leaves/large stems. (1)
- 3 To absorb as much water as possible. (1)
- 4 Carbon dioxide/sulphur dioxide/nitrogen oxide. (1)
- 5 Fertilisers spread on land/pesticides used/use of cars, lorries etc/litter/noise/dust/light. Any two – 1 mark each. (2)
- 6 Aluminium drink can. (1)
- 7 Pieces of wood. (1)
- 8 Lettuce leaf. (1)
- 9 Lettuce leaf. (1)
- 10 Snail. (1)
- 11 Thrush. (1)
- 12 Producers. (1)
- 13 Consumers. (1)
- 14 Microbes. (1)

**Total marks 15**

## Specimen assignment: Unit 2: Cells, DNA and Diseases

A group of students collected information on some of their characteristics for a project.

There were 10 people in the class including their teacher.

They recorded the information they collected in the table below.

Person	Gender	Age	Eye colour	Mass in kg	Blood group
1	male	15	brown	59	O
2	male	16	black	61	AB
3	female	16	brown	51	O
4	female	37	blue	56	A
5	female	15	brown	53	O
6	male	15	brown	58	A
7	male	15	black	59	O
8	female	15	blue	52	A
9	male	16	grey-green	70	B
10	female	15	brown	59	O

1 Which age is the most common in the group?

.....  
(1)

2 Which blood group is the **second** most common in the group?

.....  
(1)

3 (i) Which **two** people are clones (a pair of twins)?

.....  
(1)

(ii) Give **two** reasons for your choice.

.....  
.....  
(2)

4 List two inherited characteristics that appear in the table.

.....  
.....

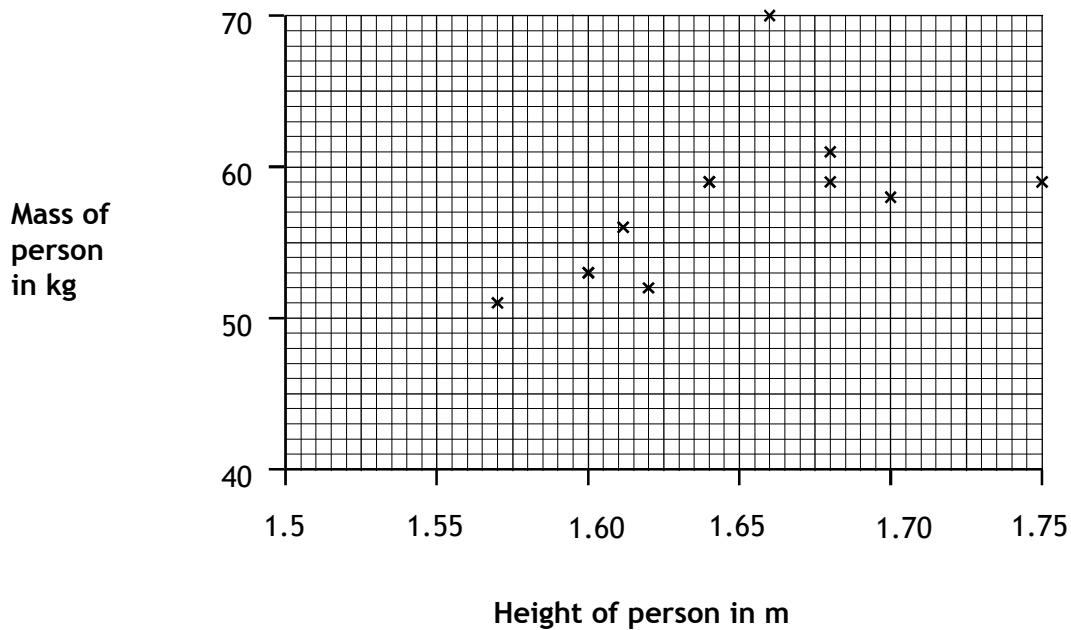
(2)

5 Name one characteristic in the table that could be due to the environment.

.....  
.....

(1)

The height and mass of each person is plotted on this graph:



6 Find the teacher in the table. Use her mass to draw a square around the point on the graph for the teacher. (1)

7 Samina joins the class.  
She weighs 55kg and her height is 1.65m.  
Plot her mass and height on the graph (1)

8 Draw the best straight line through the points. (1)

9 Use the graph to find the mass of the individual who is 1.60m in height.  
..... (2)

10 What pattern is shown between the mass and height by your line?

.....  
.....

(1)

11 Circle the point that does not fit this pattern and is the odd one out.

.....  
.....

(1)

**Total marks 15**

## Specimen assignment mark scheme: Unit 2: Cells, DNA and Diseases

- |    |  |     |
|----|--|-----|
| 1  | 15.  | (1) |
| 2  | A.   | (1) |
| 3  | (i) Individuals 5 and 10.  | (1) |
|    | (ii) The same gender; have the same blood group; the same age.<br>Any two – 1 mark each. | (2) |
| 4  | Eye colour/gender/blood group. Any two – 1 mark each.                                    | (2) |
| 5  | Mass.  | (1) |
| 6  | Square drawn around the point for a mass of 56 kg.                                       | (1) |
| 7  | Point in correct place.  | (1) |
| 8  | Correct line.  | (1) |
| 9  | 53kg (unit is needed for the full two marks).  | (2) |
| 10 | Taller people are heavier.   | (1) |
| 11 | Circle the point (1.66m, 70kg).  | (1) |

**Total marks 15**

## Specimen test: Unit 7: There's One Earth

Answer all questions.

### Question 1

Sarah and Samir are having a barbecue.

1 Which material from the list is a fuel?

paint	plastic	coal	bitumen
-------	---------	------	---------

.....  
(1)

### Questions 2 to 4

On Sarah and Samir's barbecue they are burning charcoal.

Use the words in the box to complete the sentences below.

oxygen	fuel	carbon dioxide	heat energy
--------	------	----------------	-------------

2 The charcoal that burns on the barbecue is the .....  
(1)

3 For the charcoal to start burning it needs to be given ..... in  
the form of a lighted match. (1)

4 When the charcoal burns it needs ..... gas.  
(1)

### Questions 5 to 7

Circle the correct answer for each of the following three questions.

5 Which gas is produced when the charcoal burns?

- A. Nitrogen.
- B. Carbon dioxide.
- C. Hydrogen.

(1)

6 How does this gas damage the environment?

- A. Increases global warming.
- B. Makes a lot of noise.
- C. Gives out radiation.

(1)

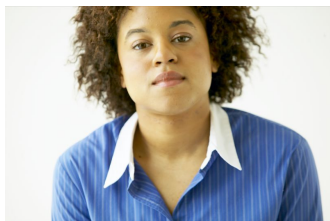
7 How can global warming damage the environment?

- A. Causes acid rain.
- B. Causes more diseases.
- C. Causes sea levels to rise.

(1)

Questions 8 to 10

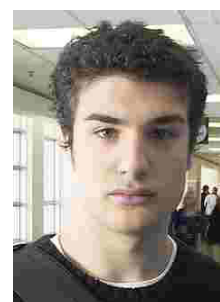
Sarah says:



Crude oil is harmful to the environment.

But Samir says:

But crude oil is really useful.



Use the words from the box to complete the sentences below.

distillation	non-renewable	millions
--------------	---------------	----------

- 8 Crude oil is formed over ..... of years. (1)
- 9 You can separate crude oil by ..... (1)
- 10 Crude oil is a ..... resource. (1)

**Questions 11 to 13**

Match the different substances that can be made from crude oil to their uses. The first answer has been completed for you.

	petrol	A. to make you feel better when you are ill
11	drugs	B. for making containers and pipes
12	plastics	C. as a fuel in car engines
13	gas	D. as a fuel in cookers

(3)

**Question 14**

Sarah wants to recycle some of the materials from the barbecue at her house. Here are some of the materials left over at the end of the barbecue.

hot dog rolls      glass bottles      burnt charcoal      metal drinks cans
---

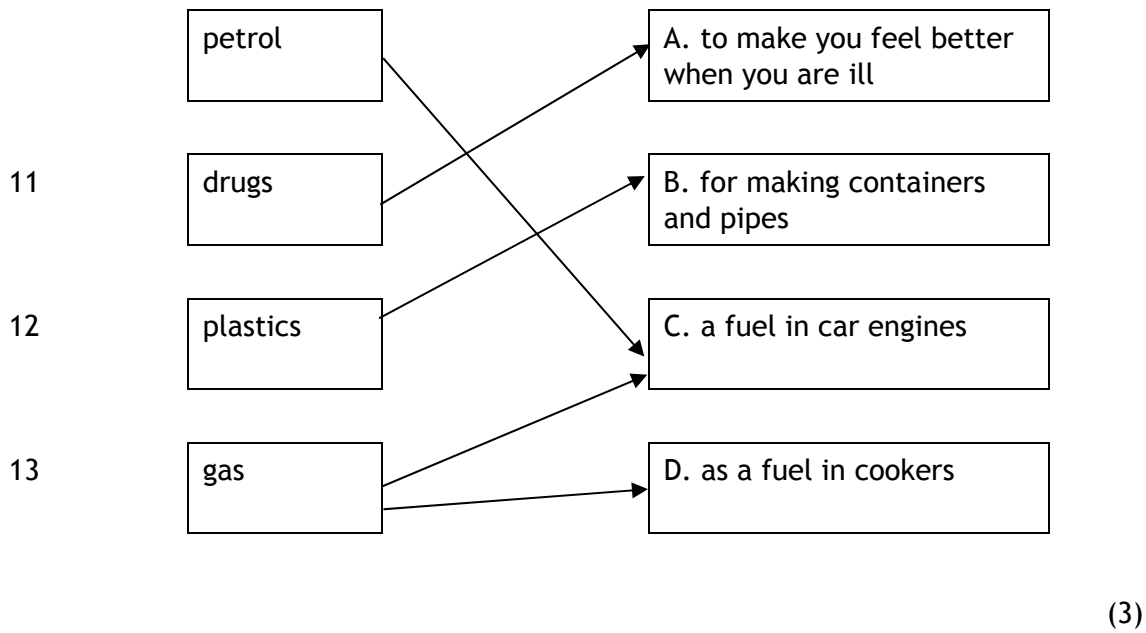
14 Which two materials from the list can she recycle?

..... and .....

(2)

## Specimen test mark scheme: Unit 7: There's One Earth

- 1 Coal. (1)
- 2 Fuel. (1)
- 3 Heat energy. (1)
- 4 Oxygen. (1)
- 5 B – carbon dioxide. (1)
- 6 A – increases global warming. (1)
- 7 C – causes sea levels to rise. (1)
- 8 Millions. (1)
- 9 Distillation. (1)
- 10 Non-renewable. (1)



14 Glass bottles and metal cans. 1 mark each

(2)

**Total marks 15**

## Specimen assignment: Unit 7: There's One Earth

### Answer all questions

Josh wants to find out what happens when he burns a fuel.

He burns a candle to see how well it heats up some water.

- 1 What equipment should Josh choose from the list to heat some water with a candle?

Select and tick **three** of the following items.

**a Bunsen burner**

**a beaker**

**some water**

**a clamp stand**

**a lamp**

**a candle.**

(3)

- 2 How could Josh tell if the water was heated up by the burning candle?

.....  
.....

(2)

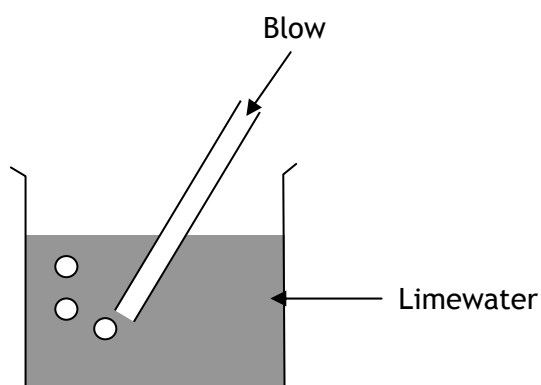
Josh's teacher tells him that the candle uses oxygen to burn and produces carbon dioxide.

- 3 Why couldn't Josh see the carbon dioxide?

.....

(1)

Josh's teacher tells him that carbon dioxide is also the gas we breathe out. This diagram shows how Josh could test the gas he breathes out.



4 What would happen when Josh blows through the tube?

The limewater would go.....

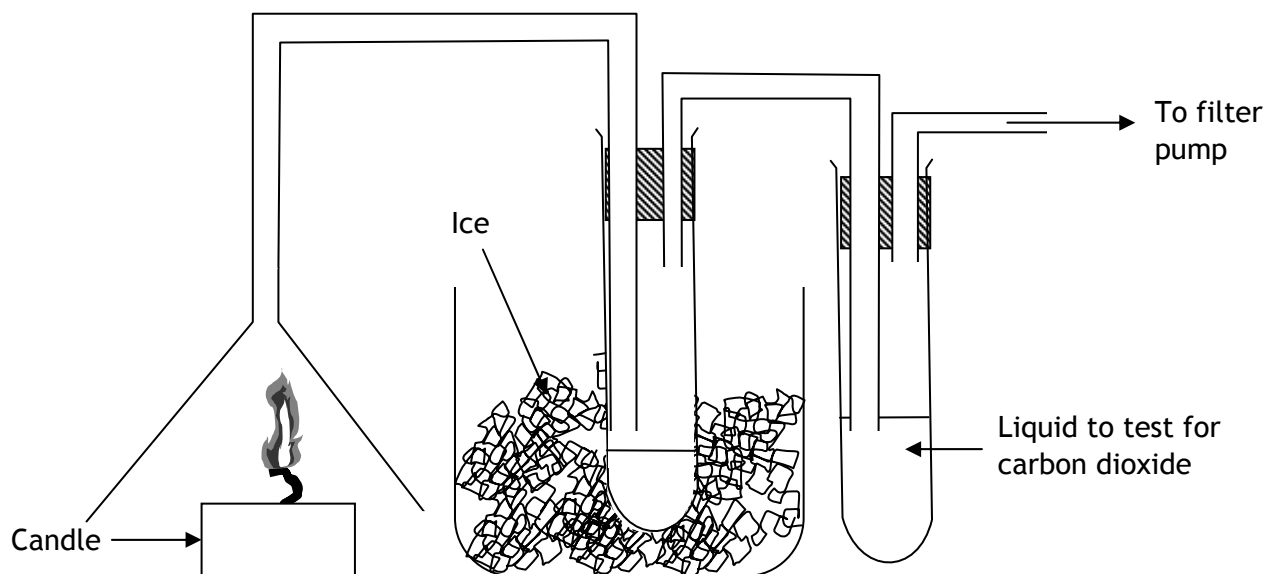
(1)

Josh then decides to find out whether carbon dioxide is really produced when the candle burns.

5 Label the diagram to show the following equipment

(3)

funnel      test tube      beaker



Josh decides to test the liquid in the first test tube to find out whether it contains water.

6 Name the white powder that is used to test for water.

.....  
(1)

7 What colour does this powder become when water is added to it?

.....  
(1)

8 The test shows that the first test tube contains water. How does this test show that the candle contains hydrogen?

.....  
(1)

9 What else is formed when a fuel is burned?

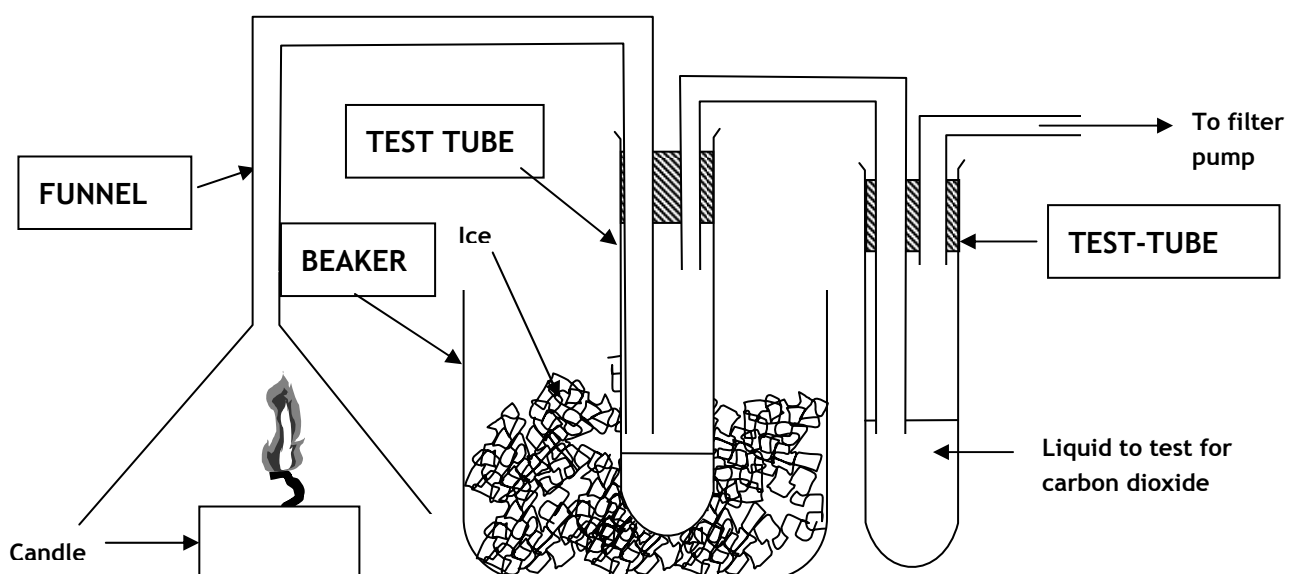
.....  
(1)

10 A burning fuel produces carbon dioxide gas. State one effect that carbon dioxide has on the environment.

.....  
(1)

## Specimen assignment mark scheme: Unit 7: There's One Earth

- 1 A beaker; some water; a candle. (3)
- 2 Take the temperature of the water. (1)  
Use a thermometer. (1)
- 3 It is colourless. (1)
- 4 Cloudy/milky/white. (1)
- 5



(Only one test tube label is required)

- 6 Anhydrous copper sulphate, white copper sulphate or copper sulphate (3)
- 7 Blue. (1)
- 8 Water contains hydrogen. (1)
- 9 Heat/soot. (1)
- 10 Global warming (or similar response). (1)

**Total marks 15**

## Specimen test: Unit 9: Electricity – its Production and its Applications

Answer all questions

### Questions 1 and 2

During a survey of electrical appliances in the laboratory, students noticed a metal plate on the back of most appliances. The following information was found on an electric kettle:

240V	~50Hz
1100W	

Use the following electrical quantities to answer questions 1 and 2.

frequency    power    voltage

- 1 1100W is a measure of the electric ..... used by the kettle.  
(1)
- 2 240V is the working ..... of the kettle.  
(1)

**Questions 3 to 5**

Use the following pictures to answer questions 3, 4 and 5.



Which **three** items use mains electricity to produce useful heat?

Write down in any order below.

(1)

3.....

(1)

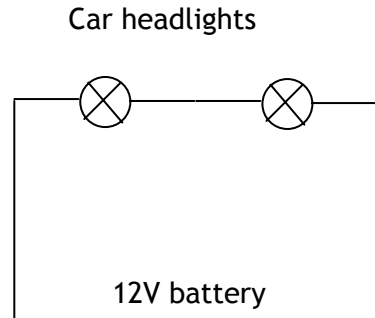
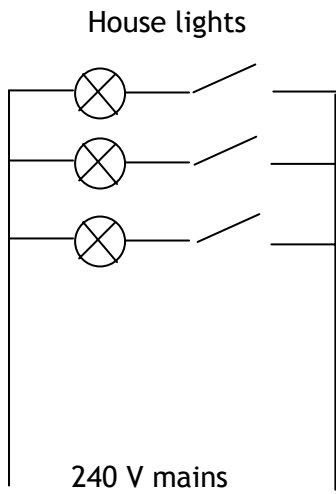
4.....

(1)

5.....

**Questions 6 and 7**

A teacher uses a set of car headlights and a set of lights in the house to illustrate series and parallel circuits.



6 How are the car headlights arranged?

series or parallel .....

(1)

7 How are lights arranged in the house?

series or parallel.....

(1)

**Questions 8 to 10**

Use some words from the box to complete the sentences 8 to 10.

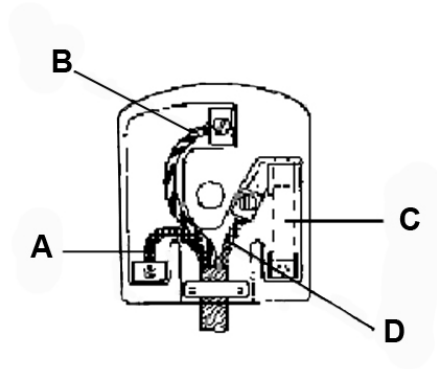
bathroom burning condensation electrocution bedroom oil
---

8 Mains power sockets should not be fitted in a .....  
(1)

9-10 Sockets present a danger of ..... if the sockets become covered in  
.....  
(2)

**Questions 11 and 12**

Look at the drawing of a wired plug.



11 Which is the fuse?

A, B, C or D? ..... (1)

12 The job of the fuse is

- A To control the current
- B To limit the current
- C To break the circuit if the current is too great.

A, B, C? ..... (1)

**Questions 13 to 15**

Tom's calculator has a solar cell and a battery.

13 Name something else that uses a solar cell..... (1)

Use some of the words from the box to answer questions 14-15.

sound    heat    light    electricity
---------------------------------------

14 The solar cell is used to produce ..... (1)

15 The solar cell needs ..... to make it work. (1)

## Specimen test mark scheme: Unit 9: Electricity – its Production and its Applications

1	Power.		(1)
2	Voltage.		(1)
3	Toaster.	} these can be in any order	(1)
4	Oven.		(1)
5	Iron.		(1)
6	Series.		(1)
7	Parallel.		(1)
8	Bathroom.		(1)
9	Electrocution.		(1)
10	Condensation.		(1)
11	C.		(1)
12	C – to break the circuit if the current is too great.		(1)
13	Any device that uses a solar cell, eg garden lights.		(1)
14	Electricity.		(1)
15	Light.		(1)

**Total marks 15**

# Assessment issues

---

## Entry Level descriptions

The following descriptions indicate the level of attainment characteristic of the given entry level. They give a general indication of the required learning outcomes at each specified level. The description should be interpreted in relation to the content outlined in the specification: they are not designed to define that content. The level awarded will depend in practice upon the extent to which the student has met the assessment objectives overall. Shortcomings in some aspects of the assessment may be balanced by better performances in others.

A table at the end of each unit illustrates how to distinguish between these two levels for that unit.

### Entry Level 1

Students recall a limited range of information from all three areas (biology, chemistry and physics) of the specification.

Students make use of knowledge and understanding in some simple everyday contexts.

Students make limited use of some scientific vocabulary, where appropriate.

Students use data from primary sources or from secondary sources provided for them.

Students respond to suggestions and put forward their own ideas about how to find the answer to simple problems.

Students carry out simple tasks and make relevant observations and measurements and record this information in a simple manner. They say whether what happened was what they expected.

Students obtain information from simple tables and charts and identify simple patterns.

### Entry Level 3

Students recall a wide range of knowledge from all three areas (biology, chemistry and physics) of the specification.

Students use and apply knowledge and understanding in some specific everyday contexts.

Students make some use of scientific and technical vocabulary, where appropriate, and make simple generalisations from information.

Students select and use information from sources provided for them.

Students relate scientific explanations to some experimental evidence.

Students devise fair tests in contexts that involve only a few factors.

Students use simple apparatus to make measurements appropriate to a task and record observations and measurements in tables or graphs.

Students obtain information from simple tables, charts and graphs and identify simple patterns in information and observations. They offer explanations consistent with the evidence obtained.

Students demonstrate an awareness of social, economic and environmental effects arising from developments in science.

## **Moderation of internally assessed components**

Teachers must keep records of the marks awarded for unit tests, assignments and practical skills, and the evidence upon which they are based. Marks should be submitted to Edexcel on the record sheets that are provided in *Appendix 1, page 105* and *Appendix 4, page 111*.

## **Internal moderation**

If more than one teacher is involved in marking tests or assignments, the marks must be standardised by internal moderation as specified in the appropriate code of practice. This must include standardisation of:

- marking tests against the mark schemes supplied by Edexcel
- marking assignments against the mark schemes supplied by Edexcel.

## **External moderation**

Edexcel will moderate teacher assessment of the assignments and of the unit tests by sampling sets of students' work; the sample may include work by all the students.

Evidence to justify the marks awarded for the unit tests and assignments must be available for each student.

The supervising teacher must certify that the assessment for each student represents the student's own attainment, based on evidence provided. Note that annotation of the evidence for assignments will be important for moderators, particularly for work carried out in groups.

Moderation will normally be carried out by post.

Edexcel will not moderate teacher assessment of practical skills.

Sampled evidence will usually be returned to centres after moderation. Edexcel may retain some work.

All evidence must be retained in the centre until the deadline for Enquiries About Results (EAR) has expired and the outcomes of any appeals have been settled.

## Awarding and reporting

The grading, awarding and certification of these specifications will be according to the requirements of the appropriate Code of Practice, which is published by QCA.

Awards of certificates will be made at the same time as the summer GCSE awards. Certificates will be awarded at each of the levels Entry 1, Entry 2 and Entry 3.

## Requirements for certification

**Evidence for two components (unit tests and assignments) must be available for moderation.** However, there is no minimum requirement for any individual component.

The marks awarded for practical skills, up to the best **five** test marks and up to the best **three** assignment marks from **different** units, will be used to determine the level of achievement. Marks for tests and assignments must be submitted from **different** units; the submission of marks for both a test **and** an assignment from the **same** unit is not permitted.

Marks for the unit tests, assignments and practical skills need to be combined as shown below to give a total mark out of 150.

Component	% weighting	Raw marks (maximum)	Conversion factor	Total marks (maximum)
Unit tests	50	75	x 1	75
Assignments	30	45	x 1	45
Practical skills	20	20	x 1.5	30

This will give each student a maximum total mark of 150. The total mark out of 150 then establishes the level a student has achieved as shown in the table below.

Level	Minimum total marks required
Entry Level 1	30/150
Entry Level 2	65/150
Entry Level 3	100/150

The marks awarded for the tests and assignments must be submitted to Edexcel on the form shown in *Appendix 1: Record sheet for unit tests and assignments*, page 105. The marks awarded for the practical skills assignments must be submitted to Edexcel on the form shown in *Appendix 4: Record sheet for the assessment of practical skills*, page 111.

For examples of how students can achieve at the different levels please see *Appendix 2: Obtaining an overall mark*, page 107.

## Prior learning and progression

No prior learning is required for these specifications. However, it is assumed that students have studied the Programme of Study for Key Stage 3 Science.

The content of the Entry Level Certificate in Science specification complements and provides progression opportunities to the GCSE Science qualification. If appropriate, it may be beneficial for students who are studying a GCSE Science course to be entered also for the Entry Level Certificate in Science.

## Language of assessment

Assessment of these specifications will be available in English only. Assessment materials will be published in English only and all written and spoken work submitted for moderation must be produced in English.

## Forbidden combinations and links with other subjects

Students who are entered for this specification may also be entered for any GCSE Science qualification.

## How to obtain the test papers and assignment papers

Please contact the GCSE Science Assessment Leader. Further support and guidance may be obtained from the 360science microsite [www.edexcel.org.uk/360science](http://www.edexcel.org.uk/360science).

## Students with particular requirements

Regulations and guidance relating to students with special requirements are published annually by the Joint Council for General Qualifications and are circulated to examinations officers. Further copies of guidance documentation may be obtained from the address below or by telephoning 0870 240 9800.

Edexcel is happy to assess whether or not special consideration or concession can be made for students with particular requirements. Requests should be addressed to:

Special Requirements  
One90 High Holborn  
London WC1V 7BH

## Enquiries about results and appeals

Edexcel has made arrangements for enquiries about results and appeals. Details are contained in the *Edexcel Post Results Service* booklet, which is distributed to all centres at the same time as the results.

# The wider curriculum

---

## Spiritual, moral, ethical, social and cultural issues and education for citizenship

This specification provides opportunities for students to explore these wider curriculum issues as well as to develop knowledge and understanding about becoming an informed citizen. This could be in the context of:

- the impact of science and technology on society
- the role of the media in providing scientific information
- wider environmental issues including sustainable development.

Opportunities within the specification for the development of these issues could occur through the teaching of the statements exemplified below:

- explain how an individual's health can be affected by the use of tobacco (Unit 4)
- describe the effect of these chemicals on:
  - lungs: lung cancer, breathlessness and smoker's cough
  - circulatory system: heart disease, lower birth mass of babies (Unit 4)
- investigate the damaging effects that harmful waste products (eg carbon dioxide, acidic gases and smoke) have on the environment when fossil fuels are burned (Unit 7)
- describe some of the physical and harmful effects of alcohol on the human body (Unit 4)
- explore some of the social issues of drinking alcohol (Unit 4)
- investigate some of the advantages and disadvantages of plastics (Unit 8)
- explain that the mains supply can provide dangerous currents which can cause serious injury or death to users (Unit 9)
- explore the advantages and disadvantages of different sources of electrical energy, including their impact on our environment (Unit 9)
- explain that reducing energy losses is important to keep down costs and to save energy resources (Unit 10).

## Environmental issues

The development of environmental awareness through the teaching of the statements exemplified below will enable students to appreciate aspects of environmental issues:

- investigate how some plants and animals are suited to their particular environments (Unit 1)
- evaluate the harmful effects of chemicals, added by humans, on land and on the atmosphere (Unit 1)
- describe some everyday examples of chemical reactions (Unit 6)
- explain that pollutants are substances or forms of energy (heat, noise, radiation) that may harm living things and the environment (Unit 7)
- investigate the damaging effects that harmful waste products (eg carbon dioxide, acidic gases and smoke) have on the environment when fossil fuels are burned (Unit 7)
- explain that too much carbon dioxide in the Earth's atmosphere can cause global warming (Unit 7)
- explore how global warming can cause damage to the Earth (eg the melting of polar ice caps causes sea levels to rise, droughts) (Unit 7)
- investigate how recycling certain materials (glass, metal, and papers) uses less energy and produces less pollution than making more of these materials (Unit 7)
- investigate some of the advantages and disadvantages of plastics (Unit 8)
- recall that crude oil was formed over millions of years and is not a renewable resource (Unit 7)
- describe how the composition and temperature of the Earth's atmosphere has altered over time (Unit 7)
- explore energy resources that:
  - will not run out (hydro, wind, solar, bio-mass, geothermal, tidal, wave)
  - will run out (oil, coal, gas, nuclear) (Unit 10)
- explain that reducing energy losses is important to keep costs down and to save energy resources (Unit 10)
- explore some methods of reducing energy losses: double glazing, cavity wall insulation, loft insulation, lagging of the tanks and pipes, draught excluders, furnishings (Unit 10).

## Health and safety considerations

In all aspects of practical work, students are required to consider the safety of themselves and others. Centres are responsible for the overall risk assessment of experimental work undertaken by students.

The following statements indicate unit content complementing the personal and social education programmes as set out in the National Curriculum:

- state that exercise and diet are important in keeping fit (Unit 4)
- investigate the effects of exercise on:
  - the pulse rate (heart rate)
  - the breathing rate
  - the body temperature (Unit 4)
- explain how an individual's health can be affected by the use of tobacco (Unit 4)
- describe the effect of these chemicals on:
  - lungs: lung cancer, breathlessness and smoker's cough
  - circulatory system: heart disease, reduced carriage of oxygen, lower birth weights of babies (Unit 4)
- evaluate some ways people use to try to give up smoking (Unit 4)
- explain why hazard symbols appear on chemical containers (Unit 6)
- explain that household products and substances in the laboratory can be dangerous to us (Unit 6)
- draw the main hazard symbols (Unit 6)
- explain that pollutants are substances or forms of energy (heat, noise, radiation) that may harm living things and the environment (Unit 7)
- investigate some of the advantages and disadvantages of plastics (Unit 8)
- describe some of the physical and harmful effects of alcohol on the human body (Unit 4)
- explain the functions of the earth wire for safety, acting with the fuse to protect the user from being electrocuted (Unit 9)
- explain how a fuse protects the appliance and its connecting wires from damage if too large a current passes (Unit 9)
- explain that other dangers include poor insulation, damaged wiring, loose wires and moisture (Unit 9)
- explain why some rooms in a house (eg bathroom) should not have power outlets or ordinary sockets (Unit 9)
- describe applications of the following ionising radiations:
  - X-rays (detecting bone fractures, chest diseases, cancer treatment)
  - gamma rays (tracers, sterilising equipment) (Unit 11).

## The European dimension

Some of the topics covered can provide a European and global dimension to scientific discoveries. This would be enhanced by students investigating current developments through the use of the internet. This dimension is supported through an appreciation of European legislation based on environmental and social issues.

The following statements from the specification provide examples of opportunities for exploring this dimension:

- describe that depending on the type of climate, soil, etc, different living things are found in different habitats (Unit 1)
- discuss that these differences (variations) between individuals are due to:
  - inherited characteristics (eg, ear lobe form, blood group)
  - their different environments (weight, behaviour) (Unit 2)
- explain how an individual's health can be affected by the use of tobacco (Unit 4)
- draw the main hazard symbols (Unit 6)
- investigate where metals are found (in the UK/world) and why gold/silver/platinum are more expensive (they are rarer than other metals) (Unit 6)
- explain that pollutants are substances or forms of energy (heat, noise, radiation) that may harm living things and the environment (Unit 7)
- investigate the damaging effects that harmful waste products (eg carbon dioxide, acidic gases and smoke) have on the environment when fossil fuels are burned (Unit 7)
- investigate how recycling certain materials (glass, metal and paper) uses less energy and produces less pollution than making more of these materials (Unit 7)
- explore some methods of reducing energy losses: double glazing, cavity wall insulation, loft insulation, lagging of the tanks and pipes, draught excluders, furnishings (Unit 10)
- explain that reducing energy losses is important to keep down costs and to save energy resources (Unit 10)
- describe applications of the use of ionising radiations:
  - X-rays (detecting bone fractures, chest diseases, cancer treatment)
  - gamma rays (cancer treatment, tracers, sterilising equipment) (Unit 11).

## Information and communications technology (ICT)

Students should be given opportunities to apply and develop their ICT capabilities through the use of ICT tools to support their learning in the delivery of science.

Students should use ICT where appropriate as they study science. This may include some of the statements exemplified below.

### Word processing

- Evaluate some ways people use to try to give up smoking (Unit 4).
- Describe the effects of these chemicals on:
  - lungs: lung cancer, breathlessness and smoker's cough
  - circulatory system: heart disease, reduced carriage of oxygen, lower birth weights of babies (Unit 4).
- Investigate the damaging effects that harmful waste products (eg carbon dioxide, acidic gases and smoke) have on the environment when fossil fuels are burned (Unit 7).
- Describe uses of energy which are important in the home, office and industry (Unit 10).

### Spreadsheet

- Explain how the elements can be arranged in a periodic table (Unit 5).
- Explore how food is kept fresh by using different types of packaging (Unit 8).
- Investigate the cost of electricity for using different appliances in the home given formulae and data (Unit 9).

### Simulation

- Describe a food chain as showing the relationship between a producer and some consumers (Unit 1).
- Explain that some reactions occur at different speeds (Unit 5).

### Data logging

Many experimental results may be obtained using data-logging equipment. Some examples include:

- investigate the effects of exercise on:
  - the pulse rate (heart rate)
  - the breathing rate
  - the body temperature (Unit 4)
- explain that some reactions occur at different speeds (Unit 5).

## The internet

The internet may be used for obtaining information in many areas of this specification including some of the statements exemplified below:

- describe properties exhibited by most metals (solid, shiny, hard, and conduct heat and electricity) (Unit 5)
- investigate where metals are found (in the UK/world) and why gold/silver/platinum are more expensive (they are rarer than other metals) (Unit 6)
- investigate the use of some common fuels (eg wood, petrol, charcoal) and fossil fuels (coal, crude oil and natural gas) (Unit 7)
- explore changes of energy resources that are likely to occur during this century (Unit 10)
- explore how our use of energy affects the environment (Unit 10).

## Literacy skills

Students will have opportunities to develop their literacy skills. These skills may be developed by producing simple illustrated leaflets or brochures and by recording experimental observations. These skills may also be developed when students are learning new terms.

The following statements from the specification illustrate some opportunities for students to develop literacy skills.

- Describe that different living things are found in different habitats, depending on the type of climate, soil, etc.
- Explain that fossils provide evidence for evolution.
- Describe some differences between humans.
- Explain that some actions of muscles take place without conscious control and that these are called reflex reactions.
- Describe the positive and negative effects that drugs, including alcohol, can have on an individual's health.
- Explain how an individual's health can be affected by the use of tobacco.
- Describe properties exhibited by most metals (solid, shiny, hard, and conduct heat and electricity).
- Describe some varied properties of non-metals, eg most do not conduct heat or electricity; many are gases.
- Describe some everyday examples of chemical reactions.
- Explain that pollutants are substances or forms of energy (heat, noise, radiation) that may harm living things and the environment.
- Describe how the composition and temperature of the Earth's atmosphere have altered over time.
- Explain why bio-fuels are sometimes used as alternatives to fossil fuels.
- Describe the properties of packaging used to keep food fresh.

- Describe some of the physical and harmful effects of alcohol on the human body.
- Describe how materials are designed for specific purposes.
- Compare the advantages and disadvantages of energy resources that will run out with those that will not run out.
- Describe how oil, coal and gas are found in large amounts underground, and how they are formed from dead animals or plants compressed over a long period of time.
- Describe uses of energy which are important in the home, office and industry; give some examples (heating, lighting, movement, entertainment, etc).
- Explore some methods of reducing energy losses: double glazing, cavity wall insulation, loft insulation, lagging of tanks and pipes, draught excluders, furnishings.
- Describe applications of the following ionising radiations:
  - X-rays (detecting bone fractures, chest diseases, cancer treatment)
  - gamma rays (tracers, sterilising equipment).
- Discuss ethical and environmental issues involving these applications.
- Discuss the equipment/resources needed to survive a space journey.

## Numeracy skills

Scientific work provides opportunities for students to develop numeracy skills, particularly when they undertake practical work (eg weighing materials, measuring temperature, recording times). The following statements from the specification illustrate some opportunities where students may develop numeracy skills.

- Explain that we sometimes need to count the numbers of living things of one kind living in an area.
- Investigate how metals and non-metals conduct heat at different rates.
- Investigate factors affecting the speed of reactions including temperature, surface area and concentration of reactants.
- Recall that gases are produced by chemical changes that can show us that a reaction is happening and how fast it is.
- Investigate how recycling certain materials (glass, metal and paper) uses less energy and produces less pollution than making more of these materials.
- Investigate the cost of electricity for using different appliances in the home given formulae and data.

## Appendix 1: Record sheet for unit tests and assignments

---

A candidate record sheet is given on the next page. Please ensure you use this record sheet as a top cover sheet when submitting candidate's work for moderation.

**Please note that if any candidates complete more than five tests, only the best five test marks should be submitted. Similarly, if any candidates complete more than three assignments, only the best three assignment marks should be submitted. Test marks and assignment marks must be submitted from different units.**

## Record sheet for unit tests and assignments

Specification number 8938

Candidate name \_\_\_\_\_ Candidate number \_\_\_\_\_

Centre name \_\_\_\_\_ Centre number \_\_\_\_\_

### Assessment marks

Please enter up to **five** best test marks and up to the **three** best assignment marks for **different** units in the following table.

Unit number	Assessment marks			
	Test (max 15 marks)		Assignment (max 15 marks)	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
<b>Total marks</b>	<b>Total for up to the five best tests (max 75 marks)</b>		<b>Total for up to the best three assignments (max 45 marks)</b>	

Marks awarded for the unit tests			=	
Marks awarded for the assignments			=	
Marks awarded for the assessment of practical skills =		x 1.5	=	
<b>Total mark (maximum 150)</b>				

Please ensure this form is completed and placed as the top sheet when submitting work for moderation.

## Appendix 2: Obtaining an overall mark

---

Evidence for two components (unit tests and assignments) must be available for moderation. However, there is no minimum requirement for any individual component.

The marks awarded for practical skills, up to the best **five** test marks and up to the best **three** assignment marks from **different** units will be used to determine the level of achievement. Marks for tests and assignments must be submitted from **different** units; the submission of marks for both a test **and** an assignment from the **same** unit is not permitted.

Marks for the unit tests, assignments and practical skills need to be combined as shown below to give a total mark out of 150.

Component	% weighting	Raw mark (maximum)	Conversion factor	Total marks (maximum)
Unit tests	50	75	x 1	75
Assignments	30	45	x 1	45
Practical skills	20	20	x 1.5	30

This will give each student a maximum total mark of 150. The total mark out of 150 then establishes the level a student has achieved as shown in the table below.

Level	Minimum total marks required
Entry Level 1	30/150
Entry Level 2	65/150
Entry Level 3	100/150

The marks awarded for the tests and assignments must be submitted to Edexcel on the form shown in *Appendix 1: Record sheet for unit tests and assignments*, page 105. The marks awarded for the practical skills assignments must be submitted to Edexcel on the form shown in *Appendix 4: Record sheet for the assessment of practical skills*, page 111.

Below are some examples of how a student can achieve the different levels.

### **Entry 1**

#### **Student 1**

Score 21 marks in five best unit tests	= 21 total marks
Plus score 8 marks in three best assignments	= 8 total marks
Plus score 8 x 1.5 marks for practical skills	= 12 total marks
<b>Total</b>	<b>= 41 marks</b>

#### **Student 2**

Score 7 marks in four unit tests	= 7 total marks
Plus score 8 marks in one assignment	= 8 total marks
Plus score 10 x 1.5 marks for practical skills	= 15 total marks
<b>Total</b>	<b>= 30 marks</b>

### **Entry 2**

#### **Student 3**

Score 42 marks in five best unit tests	= 42 total marks
Plus score 29 marks in three best assignments	= 29 total marks
Plus score 12 x 1.5 marks for practical skills	= 18 total marks
<b>Total</b>	<b>= 89 marks</b>

#### **Student 4**

Score 31 marks in four unit tests	= 31 total marks
Plus score 19 marks in three best assignments	= 19 total marks
Plus score 10 x 1.5 marks for practical skills	= 15 total marks
<b>Total</b>	<b>= 65 marks</b>

### **Entry 3**

#### **Student 5**

Score 71 marks in five best unit tests	= 71 total marks
Plus score 32 marks in three best assignments	= 32 total marks
Plus score 12 x 1.5 marks for practical skills	= 18 total marks
<b>Total</b>	<b>= 121 marks</b>

## Appendix 3: Qualification codes

---

### Qualification codes

Each qualification title, or suite of qualification titles with endorsements, is allocated two codes, as are the individual units within a qualification.

### QCA codes

The QCA National Qualifications Framework (NQF) code is known as a Qualification Accreditation Number (QAN). This is the code that features in the DfES Funding Schedule – Section 96 and is to be used for all qualification funding purposes. Each unit within a qualification will also have a QCA NQF unit code.

The QCA qualification and unit codes will appear on the student's final certification documentation.

The QAN number for the qualification in this publication is:

100/6108/3 Edexcel Entry Level Certificate in Science.



## Appendix 4: Record sheet for the assessment of practical skills

---

A sheet for recording the marks awarded for practical skills is shown on the next page. Please submit a completed copy of this form for each candidate and staple it to the candidate record sheet (*Appendix 1*).

## Record sheet for the assessment of practical skills

Candidate name \_\_\_\_\_ Candidate number \_\_\_\_\_

Centre name \_\_\_\_\_ Centre number \_\_\_\_\_

	Marks	Total
<b>Identifying/selecting equipment</b>		
Cannot identify/select equipment, even with help	0	
Can identify/select equipment with help	1	
Can identify/select equipment without help	2	
<b>Using equipment</b>		
Cannot set up simple equipment, even with guidance	0	
Can set up simple equipment with guidance	1	
Can set up simple equipment without guidance	2	
Cannot set up several pieces of equipment, even with guidance	0	
Can set up several pieces of equipment with guidance	1	
Can set up several pieces of equipment without guidance	2	
Cannot adjust equipment even with guidance	0	
Can adjust equipment when necessary with guidance	1	
Can adjust equipment when necessary without guidance	2	
<b>Following procedures</b>		
Cannot follow procedures, even with help	0	
Can follow procedures involving one stage with help	1	
Can follow procedures involving one stage without help	2	
Can follow procedures involving more than one stage with help	3	
Can follow procedures involving more than one stage without help	4	
<b>Data collection</b>		
Cannot make simple readings/observations/measurements, even with help	0	
Can make simple readings/observations/measurements with help	1	
Can make simple readings/observations/measurements without help	2	
Readings/observations/measurements are normally accurate	1	
Can identify erroneous readings/observations/measurements and retake the readings/observations/measurements	1	
Can identify a minimum number of readings/observations/measurements required to be able to reach a satisfactory conclusion	1	
<b>Presentation of results</b>		
Cannot complete a given table of results, even with help	0	
Can complete a table of results with help	1	
Can complete a table of results without help	2	
<b>Working responsibly</b>		
Works safely to avoid accidents and health risks	1	
<b>Total:</b>	<b>20 (max)</b>	

Further copies of this publication are available from  
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467  
Fax 01623 450481  
Email: [publications@linneydirect.com](mailto:publications@linneydirect.com)

Publications Code W018353 June 2006

For more information on Edexcel and BTEC qualifications please contact  
Customer Services on 0870 240 9800  
or <http://enquiries.edexcel.org.uk>  
or visit our website: [www.edexcel.org.uk](http://www.edexcel.org.uk)

Edexcel Limited. Registered in England and Wales No. 4496750  
Registered Office: One90 High Holborn, London WC1V 7BH

