edexcel

Edexcel International Lower Secondary Curriculum

Science

Specification

First examination June 2012

Edexcel International Award in Lower Secondary Science (LSC01)

ALWAYS LEARNING

PEARSON

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Acknowledgements

This specification has been produced by Edexcel on the basis of consultation with teachers, examiners, consultants and other interested parties. Edexcel would like to thank all those who contributed their time and expertise to its development.

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Introduction

Key aims of the Edexcel International Curriculum

The Edexcel International Curriculum:

- **is excellent preparation for International GCSE and GCE A Level or equivalent –** through a structured curriculum for English, maths and science
- **provides a solid benchmark of achievement,** with externally-marked achievement tests and certification at the end of Year 9 that meet rigorous international standards
- **allows you to track pupils' progress and identify barriers to learning** through a variety of age specific progress and achievement tests
- **is easy to implement and administer,** with free training and a fully-flexible structure that allows you to teach it alongside other curricula
- **offers a comprehensive, well-structured and up-to-date learning platform** to ease the transition to upper secondary education
- **offers unrivalled and unique delivery support,** with detailed suggestions of published resources embedded within each unit to help you implement the curriculum
- **gives you and your pupils a seamless and cohesive teaching and learning experience,** especially when used alongside other Edexcel qualifications for ages 8–19.

Key features and benefits of the achievement test

The achievement test:

- gives pupils a tangible record of achievement to use when progressing to International GCSE or equivalent
- enables pupils to gain experience of the standards required for International GCSE and equivalent examinations
- is externally marked by Edexcel so you can be assured of the level of achievement of your pupils
- complies with rigorous global standards
- provides certification at the end of Year 9.

Contents

Specification at a glance

The Edexcel International Award in Lower Secondary Science comprises one test.

Test	**Paper code LSC01/01**
• Externally assessed • Availability: June series • First assessment: June 2012	
Overview of content: Life processes and living things • Unit 1: Science and fiction • Unit 2: A model career • Unit 3: On the farm • Unit 4: Crime scene investigations Materials and their properties • Unit 5: Building for the future • Unit 6: Sculpture park • Unit 7: Cleaning up • Unit 8: Flying materials Physical processes • Unit 9: Buying energy • Unit 10: Satellites and space • Unit 11: Record breakers • Unit 12: Dam it! Scientific Enquiry • Unit 13: Scientific enquiry	
Overview of assessment • Section A consists of 60 marks addressing, with equal weighting, life processes and living things, materials and their properties and physical processes. • Section B consists of 20 marks on scientific enquiry. • The test duration is 1 hour 20 minutes. • Questions target levels S1, S2, S3 and S4.	

Award content

This Edexcel International Award in Lower Secondary Science requires pupils to demonstrate knowledge, understanding and application of the following learning objectives drawn from Year 9 of the International Curriculum. The content amplification also includes aspects of learning from Years 7 and 8.

Life processes and living things

Unit 1: Science and fiction

Learning objective	Pupils should:
a) Describe the role of the sex cells (gametes) in sexual reproduction	• use the term *gamete* correctly with reference to sex cells. • understand that egg cells and sperm cells are the female and male gametes.
b) Describe how genetic information is passed on from parents to offspring in sexual reproduction	• understand that genetic information from each parent is carried in the nucleus of each gamete and that when gametes join together both sets of genetic information are passed on to the baby.
c) Explain what genetic information is and how it is stored	• use the terms *nucleus*, *chromosome*, *gene* and *DNA* correctly. • understand that chromosomes are found in the nucleus of a cell and that they contain information about an organism's characteristics in the form of genes. • know that chromosomes are made of DNA and that this genetic information can be copied.
d) Explain how dominant and recessive alleles cause their effects	• use the terms *dominant*, *recessive* and *allele* correctly. • understand the outcomes of simple Punnett squares, e.g. eye colour, CF. • use the terms *genotype* and *phenotype* correctly.

Learning objective	Pupils should:
e) Identify and describe characteristics that are of benefit or harmful to an organism	• recall simple examples of each, such as antibiotic resistance being of benefit to bacteria, but some inherited conditions, e.g. cystic fibrosis, being harmful to humans.
f) Recall some inherited characteristics and some that are influenced by environmental conditions	• understand that characteristics such as eye colour are inherited. • Use the terms *continuous* and *discontinuous variation* correctly, building on previous knowledge of variation within a species. • understand that some characteristics such as plant height are also influenced by the environment.
g) Describe how inherited and environmental factors can affect characteristics	• understand that although some animal characteristics, such as height, body mass or predisposition to illness, may have genetic components, lifestyle factors can also affect these characteristics. • understand that although some plant characteristics, such as height, may have a genetic component this will also be affected by environmental factors such as availability of light/minerals.
h) Recognise that animal breeding has gone on for hundreds of years	• understand that animals such as dogs, horses and cattle have been bred for desirable characteristics for hundreds of years.
i) Explain how offspring with particular characteristics can be produced by selective breeding	• understand that the stages in selective breeding involve identification of desired characteristics in the parents, breeding and then selection of offspring. • understand that selective breeding must be repeated over many generations.
j) Explain how mammals can be cloned	• use the term *clone* correctly with reference to genetically identical individuals. • know the steps used to clone Dolly the sheep. The principles of nuclear transfer and surrogacy should be described.

Learning objective	Pupils should:
k) Describe some ways in which plants can reproduce asexually to produce clones	• understand that plants often clone themselves naturally by producing runners, e.g. strawberry. • understand that asexual reproduction produces genetically identical offspring and is often used by plants to reproduce quickly.
l) Explain how organisms can be genetically modified (GM)	• understand that GM plants have been given genetic information from other organisms in order to enhance their own characteristics, e.g. to improve shelf life, to give them resistance to disease or resistance to weedkiller. • details of the use of vectors and/or gene guns are **NOT** required.
m) Describe some of the public reaction to introducing genetically modified organisms	• understand that the public may not have sufficient information on which to make a judgement about genetically modified (GM) organisms. • understand that the public may have concerns about GM organisms, e.g. long term health effects or genes being passed on to other organisms.
n) Suggest arguments for and against selective breeding, cloning and genetic modification	• recall some of the arguments for and against each of these processes.
o) Explain why certain secondary sources of information have been chosen and use those sources to answer questions	• interpret information presented as a simple secondary source article relating to, e.g. the work of Doll on smoking, the cloning of Dolly the sheep or the GM debate.

Unit 2: A model career

Learning objective	Pupils should:
a) Know how the human respiratory, digestive and circulatory systems interact to maintain activity	• know the role of each of these systems in the body.
b) Know the functions of the skeleton	• know that the skeleton provides protection using skull and ribs as examples. • know that the skeleton also provides support and allows movement.
c) Explain how diet, exercise, smoking and drugs affect health	• know the effects of tar, nicotine and carbon monoxide from cigarette smoke. • use the term *addictive* correctly with reference to nicotine and other substances. • know examples of how drugs can affect the body. • know the term *balanced diet* and what it comprises. • relate all the above factors to increased risk of long-term health problems using emphysema and bronchitis as examples of lung conditions • consider the contribution that these lifestyle factors make to the risk of high blood pressure and coronary heart disease.
d) Find out how scientists linked diseases to a lack of specific nutrients	• understand the term *deficiency disease.*
e) Consider how the work of different scientists has contributed to a medical advance	• understand that such discoveries are seldom the work of just one individual or research team • use the terms *collaboration*, *evidence* and *peer review* correctly in this context

Unit 3: On the farm

Learning objective	Pupils should:
a) Know that photosynthesis is the key process producing new plant biomass and that that chlorophyll enables a plant to utilise light in photosynthesis	• use the terms *chlorophyll*, *chloroplast*, *photosynthesis* and *biomass* correctly.
b) Know that carbon dioxide for photosynthesis comes from the air and that the water is absorbed through the roots	• know a word equation for photosynthesis. • know that root hairs increase the surface area of a root. • the uptake of minerals by roots, the use of nitrates for growth and magnesium ions for chlorophyll is assumed knowledge from earlier work.
c) Understand the importance of photosynthesis to humans and other animals	• be able to link photosynthesis to the producers in a food chain and also to global food supplies. • knowledge and interpretation of food chains/webs and the terms *predator*, *prey*, *herbivore* and *carnivore* are assumed knowledge from earlier work.
d) Investigate some of the factors influencing the rate of photosynthesis	• describe/interpret simple experimental procedures and results from investigating the effects of light, CO_2 and temperature on the rate of photosynthesis. • understand that these factors can be controlled in a greenhouse.

Unit 4: Crime scene investigations

Learning objective	Pupils should:
a) Understand how the management of food production has many implications for other animal and plant populations in the environment	• understand that crop monoculture (term **NOT** required) can reduce the range of animal and plant life in an area and that this puts those animals and plants at greater risk from environmental change. • understand the effects of agricultural machinery, weedkillers and pest control on the animal and plant populations in an area. • use the term *organic farming* correctly.
b) Develop understanding about factors affecting plant growth	• understand that both genetic and environmental factors affect plant growth.
c) Consider some of the issues involved in sustainable development of the countryside	• understand the role of, for example, national parks in preserving the countryside for future generations in contrast to the need for housing and agricultural land.
d) Investigate the effects of fertiliser on plant growth	• plan/interpret simple investigations into the effect of fertiliser on plant growth. • understand how to interpret data from such investigations, presented as tables or graphs.

Materials and their properties

Unit 5: Building for the future

Learning objective	Pupils should:
a) Compare the properties of metals and non-metals	• use the terms *conductor*, *insulator*, *malleable*, *ductile* correctly.
b) Describe familiar uses of metals linked to their properties and identify benefits and drawbacks in the use of particular metals	• understand that the reactivity of a metal with water, oxygen and/or acid will affect the uses to which it can be put. • understand that the thermal and electrical conduction properties of metals are significant in determining their uses.
c) Represent elements by symbols and compounds by formulae	• use conventions such as upper/lower case and subscript where appropriate accurately.
d) Know that different acids react in similar ways with metals, with metal carbonates and with metal oxides, and use word and symbol equations to describe these reactions	• recall formulae for metal carbonates and oxides and be able to use them to write or complete word and symbol equations.
e) Devise and evaluate a method for preparing a sample of a specified salt	• know that metal oxides are bases and they react with acids to form salts and water. • understand what is meant by a *neutralisation* reaction, using production of copper sulphate as an example. • an understanding of the pH scale and the terms *acid* and *alkali* are assumed knowledge from previous work.

Unit 6: Sculpture park

Learning objective	Pupils should:
a) Use the particle model (including some ideas about sub-atomic particles) and ideas about bonding to explain a number of aspects of the reactivity of metals	• use the terms *atom* and *molecule* correctly. • factors indicating that a reaction has taken place and knowledge of reversible and non-reversible reactions is assumed knowledge from previous work.
b) Use the particle model to work out symbol equations	• understand that the number of atoms in an element must be balanced in a symbol equation.
c) Explain the difference between elements, compounds and mixtures	• know definitions of and be able to identify examples of *elements*, *compounds* and *mixtures.* • basic separation techniques for mixtures such as using a magnet sieving and filtration are assumed knowledge from previous work. • generic properties of solids, liquids and gases, including arrangement of particles, is assumed knowledge from previous work. • an overview of the Periodic Table to include the use of the terms *group* and *period* is assumed knowledge from previous work.
d) Explain how some metals react with oxygen	• know that some metals, such as iron, react with oxygen in the air but some metals, such as gold, do not.
e) Describe some simple ways of preventing corrosion and explain how different methods of corrosion protection work	• understand the use of galvanising and plating to prevent corrosion.
f) Identify patterns in the reactions of different metals, and in the reaction of a particular metal with water	• know that some metals are more reactive than others and be able to use information to construct a simple reactivity series for metals with water.

Learning objective	Pupils should:
g) Explain how some metals react with water	• know that metals react with water to produce metal hydroxides and hydrogen. • know examples of metals that are very reactive with water, e.g. calcium, sodium, potassium.
h) Identify patterns in the reactions of different metals, and in the reaction of a particular metal with acids	• know that some metals are more reactive than others and be able to use information to construct a simple reactivity series for metals with acids. • understand factors which would affect rate of reaction such as surface area of metal or strength of acid.
i) Explain how some metals react with acids	• know that metals react with acids to produce a metal salt and hydrogen. • understand that salts are named from the acid used in the reaction.
j) Draw and use word equations as part of an explanation	• use and/or complete word equations to summarise reactions.
k) Use the reactivity series and a particle model to predict and interpret displacement reactions of metals	• use the terms *displacement* and *reactivity series* correctly.
l) Use evidence to develop ideas of reactivity and explain how different pieces of evidence support the idea of the reactivity series	• be able to interpret information provided to construct a reactivity series.
m) Link the observational evidence of displacement reaction to the energy transfer and rearrangements of bonds between atoms	• be able to describe, compare and explain the reactivity of different metals.

Unit 7: Cleaning up

Learning objective	Pupils should:
a) Know that rocks, soils and building materials have a variety of chemical characteristics	• use the terms *igneous*, *sedimentary* and *metamorphic* correctly with reference to rocks such as granite and basalt, sandstone and limestone, slate and marble. • understand the term *porous* and relate this to the uses of a material. • relate hardness and ease of cutting to uses of a material.
b) Understand how chemical weathering alters rocks and building materials over time	• know how acid rain is formed and how it damages buildings. • understand that landscapes and coastlines can change over time as a result of erosion.
c) Know how the atmosphere and water resources are affected by natural processes and the activity of humans	• know the sources of carbon dioxide and sulphur dioxide and their impact on the atmosphere and on pond life.
d) Know how scientists work to monitor the environment	• know how indicator organisms can be useful in monitoring pollution. • understand methods of monitoring the environment such as collecting data on temperature, comparing current and historical data, and computer modelling. • understand that many aspects of this require global collaboration.
e) Understand how evidence for climate and environmental change needs careful interpretation	• understand that scientists differ in their interpretation of this data. • understand that some individuals and/or organisations may be biased in how they interpret this data.

Unit 8: Flying materials

Learning objective	Pupils should:
a) Explore further ways in which chemical reactions can be used as an energy source, or as a process for making new materials	• understand why new energy sources are being sought to replace fossil fuels. • consider the advantages and disadvantages of hydrogen as a fuel. • consider fuels used in rockets.
b) Model chemical reactions as the rearrangement of atoms, and use the model to explain that matter is not lost	• understand the law of conservation of mass. • understand why some reactions appear to lose or gain mass, e.g. when a gas is produced.
c) Consider how the particle model and knowledge of gases helped change earlier ideas about burning	• understand how early theories about the role of phlogiston in burning have been superseded by current models.

Physical processes

Unit 9: Buying energy

Learning objective	Pupils should:
a) Explore a range of useful energy transfers and transformations	• understand the law of conservation of energy. • use Sankey diagrams to represent and interpret a range of energy transfers.
b) Use the principle of conservation of energy to identify ways in which energy is dissipated during transfers	• use the term *efficiency* correctly in the context of energy transfer.
c) Understand the concept of voltage with the transfer of energy in a circuit, and investigate the voltage of cells	• know that a voltmeter measures in volts (V) and is connected in parallel to the cell.
d) Measure voltage in circuits, and identify patterns in the measurements of voltage in series circuits and use these to draw conclusions	• understand that increasing the voltage will increase the current if the components are kept the same. • be able to carry out simple calculations to find unknown voltages when some voltages in a circuit are given.

Unit 10: Satellites and space

Learning objective	Pupils should:
a) Recall some evidence for the shape of the Earth	• understand the effect of gravity in making the Earth spherical. • know examples of evidence, e.g. pictures from space; calculations of shadow length at the same time at different longitudes; Earth casts a circular shadow on the Moon during lunar eclipses.
b) State what an artificial satellite is and one use for a satellite and describe some uses of artificial satellites	• use the term *artificial satellite* correctly and know that their uses include weather forecasting, map making, communications and observation.
c) Describe how artificial satellites can be used for scientific research	• know that satellites can be used to orbit the Earth and other planets to take photographs and provide scientific data, e.g. temperatures.
d) Recall that planets and satellites are kept in their orbits by gravity	• understand that the Earth's orbit is maintained by the Sun's gravity and transfer this understanding to other planets and satellites.
e) Recall that gravity always pulls things towards the centre of the Earth	• know that gravity is a force measured in newtons (N).
f) Explain that an object on Earth has weight because of gravity	• understand the difference between *weight* and *mass* and use these terms correctly.
g) Recall that gravity is stronger if the objects have more mass	• know that the greater the mass of an object, the stronger the gravitational force it exerts.
h) Recall that gravity is weaker if objects are further apart	• know that the further away from the centre of the Earth an object is, the weaker the strength of the gravitational force on it. • understand how distance from the Sun affects the orbit of different planets.

Learning objective	Pupils should:
i) Recall that gravity is not the same everywhere on the Earth and explain how gravity surveys can be used to investigate the structure of the Earth	• know that the Earth's gravity pulls on every kilogram with a force of 10N. • understand that the top of a high mountain is further from the centre of the Earth than its base, so the strength of its gravity will be less at the top.
j) Use data to work out the relationships between gravity, mass and distance	• understand and carry out simple calculations involving gravity.
k) Calculate weights given the strength of gravity and the mass	• understand and carry out simple calculations given appropriate data, e.g. calculate the weight of an object on the Moon.
l) Explain why it is important for spacecraft to have as small a mass as possible	• understand that the more massive the spacecraft the greater the gravitational force on it.
m) Explain why astronauts appear to be weightless in space	• understand that, for example, the Moon's gravity is less than that of the Earth because it has less mass.
n) Describe how gravity helped the formation of the Solar System	• understand that the increasing mass of a dust cloud increases its gravitational pull.
o) Describe the benefits of gravity-assist trajectories	• understand that engineers planning the route of a spacecraft can use the gravity of the planets it passes to help the spacecraft reach its destination.
p) Describe different types of orbit and how they are suited to different purposes	• use the terms *geostationary orbit* and *polar orbit* correctly. • understand that geostationary orbits ensure that communication satellites remain above the same point on the Earth. • understand that polar orbits enable satellites to eventually pass over all parts of the Earth.
q) Consider the advantages and disadvantages of different ways of exploring the Solar System	• understand that cost, distance, risk and the lifespan of living organisms can affect ways chosen to explore the Solar System. • understand that the type of evidence required will also affect the chosen method.

Learning objective	Pupils should:
r) Recall that light is part of the electromagnetic spectrum, and how different parts of the spectrum can provide information about the Solar System and the stars	• know that different types of stars give out different combinations of electromagnetic (EM) waves and that this can provide evidence for the kinds of nuclear reactions happening inside the star. • know that infrared radiation can provide evidence about objects in space that are too cool to be seen using visible light.
s) Explain refraction and reflection using the wave model for light	• use the terms *refraction* and *reflection* correctly. • understand that light changes direction as it goes from one transparent material to another. • understand how light is reflected off an object.
t) Recall that there have been various models of the Solar System and how and why these have changed; explain the role of prediction and testing in the acceptance of models of the solar system	• understand that early models by Aristotle, Ptolemy, Copernicus and Galileo were superseded by later models. • understand that models were influenced by evidence available at the time. • understand that the ability to make predictions about where planets will be on a particular date provides evidence that a model is correct or not. • knowledge of the rotation and orbit of the Earth, its duration and the effect of this on day/night, seasons is assumed knowledge; similarly the orbit time of the moon.
u) Recall one example of an early model of the Solar System	• understand that in Ptolemy's model, the Earth was at the centre of the universe, with other planets and the Sun in orbits around it.
v) Recognise some questions that science cannot yet answer	• understand that there may be insufficient evidence to answer a particular scientific question and that this may be because of technological or other difficulties that need to be, or cannot be, overcome.

Learning objective	Pupils should:
w) Explain why the acceptance or rejection of scientific theories may sometimes depend on technological developments	• understand that improvements in equipment and/or experimental techniques may provide more evidence to support the acceptance or rejection of a scientific theory.
x) Describe some ways in which the Solar System can be explored	• know that the Solar System has been explored using spacecraft with/without animals and/or people aboard. • understand the use of space probes.
y) Describe some evidence showing a particular theory is incorrect	• know that the Steady State theory was developed in the 1940s, by Hoyle et al as a mathematical model of how the Universe began. • understand that more recent evidence from observations now supports the Big Bang theory. • understand that this principle of obtaining further evidence to support or refute a hypothesis is fundamental to how progress in science has been made in many fields.
z) Describe how astronomy and space science provide evidence of the Solar System and our galaxy	• understand that photographs and scientific data collected by observations from the Earth and from space can contribute to the evidence needed to develop further understanding of the Solar System and our galaxy.

Unit 11: Record breakers

Learning objective	Pupils should:
a) Understand the relationship between forces (including balanced forces) on an object, and its movement	• understand that balanced forces keep a moving object at a constant speed. • understand that unbalanced forces can start or stop movement, speed up or slow down a moving object and/or change the direction of an object's movement.
b) Recognise how forces affect the way in which objects move and how the overall effects of forces can be calculated	• use the term *resultant force* correctly. • be able to carry out simple calculations of resultant forces.
c) Explore the effects of water and air resistance on speed, and how streamlining reduces these effects	• use the terms *air resistance* and *streamlining* correctly. • understand streamlining with reference to car designs, high-speed trains and sports clothing and equipment.
d) Measure and calculate, with appropriate precision, the speed of objects in a range of situations and construct and interpret speed-time graphs, describing patterns or relationships	• use the term *terminal velocity* correctly.

Unit 12: Dam it!

Learning objective	Pupils should:
a) Study pressure on solids and fluids and describe applications of this	• know that pressure is measured in N/m^2 (Pa). • know how to carry out simple calculations involving pressure, force and area. • consider applications such as hydraulic braking systems and the effect of different surface areas of solids.
b) Describe the operation of levers, including examples from the human body, which depend on the turning effect of a force	• use the terms *pivot* and *moment* correctly. • apply the principle of levers to simple situations, including the human arm.
c) Understand the principle of moments	• know how to calculate the moment of a force and know that the unit is Nm.
d) Investigate balance about a pivot, evaluating strengths and weaknesses in their methods	• understand how to use moments to work out if something will balance.

Scientific Enquiry

Unit 13: Scientific enquiry

	Learning objective:	Pupils should:
Ideas & evidence in science	a) Know that science is about thinking creatively to try to explain how living and non-living things work	• suggest links between causes and effects. • suggest reasons for their observations.
	b) Know that it is important to test ideas using evidence from observation and measurement	• understand the definitions of qualitative versus quantitative data but these terms need **NOT** be used.
Investigative skills	c) Ask questions that can be investigated scientifically and decide how to find answers	• design simple experiments to test a scientific idea.
	d) Consider what might happen before carrying out an investigation	• make simple predictions based on information provided and/or knowledge from the curriculum.
	e) Know the names of simple pieces of equipment and how they are used f) Select appropriate equipment for use in an investigation	• use thermometers, beakers and measuring cylinders as well as other equipment as indicated in specific areas of the curriculum.
	g) Know how to conduct a fair test	• understand that only one variable should be changed; others should be controlled. • identify an example of a variable that should be controlled in a given investigation. • be familiar with the use of a control experiment for making comparisons.
	h) Identify several variables in an investigation and plan how to control them	• use the terms *independent variable* and *dependent variable* correctly. Be able to identify these for a given investigation. • understand that other variables must be controlled and how to do this.

	Learning objective:	Pupils should:
Obtaining & presenting evidence	i) Be able to carry out simple experiments	• use simple equipment and materials appropriately, taking action to control risks • be able to identify hazards and control measures e.g. use of safety glasses.
	j) understand the need for safety glasses, care with acids and other basic safety measures as appropriate to the investigation	• suggest ways to remain safe when carrying out investigations.
	k) Be able to make systematic observations and measurements	• take readings from apparatus e.g. volume of liquid in a measuring cylinder or temperature reading on a thermometer. • understand the term 'accuracy'.
	l) Explain the need to collect valid and reliable results, being aware of the impact of human error, and sensitivity and accuracy of measuring instruments	• use the terms *valid*, *reliable* and *accurate* correctly. • understand that random and systematic errors affect results differently.
	m) Be able to check observations and measurements by repeating them where appropriate	• understand the term 'reliability'.
	n) Be able to use diagrams, drawings, tables, bar charts and line graphs to present data	• plot/draw or interpret data using these methods of presentation.
	o) collect, use and store data in a clear way. Produce graphs using ICT and identify patterns in them	• be able to interpret information presented in tables and bar/line graphs. • be able to put tabulated information on to a bar/line graph. • in the context of genetic information this might be characteristics showing *continuous* and *discontinuous variation.*

	Learning objective:	Pupils should:
Considering evidence & evaluating	p) Make comparisons and identify simple patterns or associations in observations and measurements or other data	• be able to identify result(s) that do not fit the pattern. • compare two or more simple sets of data.
	q) Use observations, measurements or other data to draw conclusions	• suggest reason(s) for patterns in results. • suggest reason(s) why a particular result does not fit the pattern of the other results.
	r) Use their scientific knowledge to explain some of their results	• link patterns and trends in the results to scientific knowledge. • use scientific knowledge to suggest reasons for anomalies.
	s) Decide whether conclusions agree with predictions and/or make further predictions	• consider evidence to decide if it supports a prediction. • suggest what might happen if the experiment was conducted again with a change to one variable.
	t) Use scientific knowledge and understanding to explain observations, measurements and/or other data or conclusions	• give reasoned explanations based on pupils' own scientific knowledge and understanding.
	u) Review own work and that of others in order to describe its significance and limitations	• make practical suggestions about how their work, or the work of others, could be improved, giving reasons for their suggestions.

Assessment summary

The test is externally assessed through an examination paper lasting 1 hour and 20 minutes.

Summary of table of assessment

Test	**Paper code: LSC01/01**
Overview of assessment • Section A consists of 60 marks addressing, with equal weighting, life processes and living things, materials and their properties and physical processes. • Section B consists of 20 marks on scientific enquiry. • The test duration is 1 hour and 20 minutes. • Questions target levels S1, S2, S3 and S4.	

Levels of attainment and weightings

	% in test
S1	35
S2	30
S3	25
S4	10
TOTAL	**100%**

Entering your pupils for assessment

Pupil entry

Details of how to enter pupils for this award can be found in Edexcel's *Information Manual*, copies of which are sent to all active Edexcel centres. The information can also be found on the Edexcel website: www.edexcel.com

Access arrangements and special requirements

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, International GCSE, Entry Level and PLSC qualifications aims to enhance access to the qualifications for pupils with disabilities and other difficulties without compromising the assessment of skills, knowledge, understanding or competence.

Please see the Edexcel website (www.edexcel.com/sfc) for:

- the Joint Council for Qualifications policy *Access Arrangements and Special Considerations, Regulations and Guidance Relating to Students who are Eligible for Adjustments in Examinations*
- the forms to submit for requests for access arrangements and special considerations
- dates for submission of the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements
Edexcel
One90 High Holborn
London, UK
WC1V 7BH

Assessing your pupils

The first assessment opportunity for this award will take place in the June 2012 series and in each following June series for the lifetime of the award.

Awarding and reporting

The awarding and certification of this award will comply with the requirements of the current GCSE/GCE Code of Practice, which is published by the Office of Qualifications and Examinations Regulation (Ofqual).

The Edexcel International Award in Lower Secondary Science is awarded at four levels:

- P3/S1 (Level S1 is equivalent in standard to level P3 on the Edexcel International Award in Primary Science)
- S2
- S3
- S4.

The first certification opportunity for the Edexcel International Award in Lower Secondary Science will be 2012.

Pass description

Please see *Appendix A: Levels of attainment*. To achieve an award, a pupil must demonstrate the characteristics for the level across the four attainment levels for science.

Language of assessment

Assessment of this test will be available in English only. Assessment materials will be published in English only and all work submitted must be produced in English.

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the Joint Council for Qualifications *Suspected Malpractice in Examinations: Policies and Procedures* document on the Joint Council for Qualifications website www.jcq.org.uk/

Pupil recruitment

Edexcel's access policy concerning recruitment to our qualifications and awards is that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all pupils.

Prior learning

This award builds on the content, knowledge and skills developed in the Edexcel International Curriculum for Lower Secondary Science.

Progression

This award supports progression to Edexcel International GCSEs in Biology, Chemistry and Physics and Science (Double Award).

Support and training

Edexcel support services

Edexcel has a wide range of support services to help you implement this test successfully.

Ask the Expert – To make it easier for you to raise a query with us online, we have merged our **Ask Edexcel** and **Ask the Expert** services.

There is now one easy-to-use web query form that will allow you to ask any question about the delivery or teaching of Edexcel qualifications. You'll get a personal response, from one of our administrative or teaching experts, sent to the email address you provide.

We'll also be doing lots of work to improve the quantity and quality of information in our FAQ database, so you'll be able find answers to many questions you might have by searching before you submit the question to us.

Examzone – The Examzone site is aimed at pupils sitting external examinations and gives information on revision, advice from examiners and guidance on results, including re-marking, re-sitting and progression opportunities. Further services for pupils – many of which will also be of interest to parents – will be available in the near future. Links to this site can be found on the main homepage at www.examzone.co.uk.

Training

A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Edexcel. Full details can be obtained from our website: www.edexcel.com

Appendices

Appendix A: Levels of attainment

Attainment targets set out the knowledge, skills and understanding that pupils of different abilities and maturities are expected to have by the end of each level. The targets consist of six levels of increasing difficulty across Primary and Lower Secondary Science. Level S1 in Lower Secondary Science is equivalent in standard to level P3 on the Edexcel International Award in Primary Science.

Each level description describes the type and range of performance that pupils working at that level should characteristically demonstrate. It is hierarchical so it is assumed that a pupil working at a particular level will demonstrate the descriptor at that level in addition to those at earlier levels.

Level	Attainment Target 1: Scientific enquiry
S1	Pupils suggest how to collect valid data to answer questions. Where appropriate they make predictions, supported by their scientific knowledge and understanding. They select apparatus for a range of tasks and plan to use it effectively. They begin to repeat observations and measurements with precision appropriate to the task, offering simple explanations for any differences they encounter. When an investigation involves a fair test, they identify key factors to be considered. They describe these as variables and show understanding that one variable must be kept constant. They record observations and measurements systematically and, where appropriate, present data as line graphs where at least one axis or other guidance is provided. They identify patterns in recorded measurements and can communicate simple pattern statements making reference to the relationship between two variables. The can point out data that does not fit the pattern and suggest simple reason(s). They use appropriate scientific language and conventions to communicate simple quantitative and qualitative data. They draw conclusions that are consistent with the evidence and begin to relate these to scientific knowledge and understanding. They make practical suggestions about how their working methods, or those of others could be improved, giving reason(s).

Level	Attainment Target 1: Scientific enquiry
S2	Pupils design simple investigations to collect valid data to answer questions using scientific knowledge and understanding to identify an appropriate approach. They make sufficient measurements, comparisons and observations for the task. They measure, or plan to measure, a variety of quantities with precision, using instruments with fine-scale divisions. They choose scales for simple graphs and diagrams that enable them to show data and features effectively. When they identify measurements and observations that do not fit the main pattern shown they can offer reasons based on scientific knowledge and understanding. They draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain them. They make reasoned suggestions about how their working methods could be improved. They select and use appropriate methods for communicating qualitative and quantitative data using scientific language and conventions.
S3	Pupils recognise predictions based on scientific theories and give examples of the evidence collected to test these predictions. In their own work they use scientific knowledge and understanding to decide on appropriate approaches to answer questions. They identify the key variables in more complex contexts and plan appropriate procedures. They identify from looking at patterns and trends when they need to repeat measurements, comparisons and observations to obtain reliable data. Where appropriate, they represent data in graphs, using lines of best fit. They draw conclusions that are consistent with the evidence and explain these using scientific knowledge and understanding. They begin to consider whether the data they have collected are sufficient for the conclusions they have drawn. They communicate what they have carried out using a wide range of scientific and technical language and conventions, including symbols and flow diagrams. They identify possible limitations in secondary data.

Level	Attainment Target 1: Scientific enquiry
S4	Pupils recognise that investigating different kinds of scientific question require different strategies and can design experimental procedures accordingly. They use scientific knowledge and understanding to select an appropriate strategy in their own work. They decide which observations are relevant in qualitative work and include suitable detail in their records by designing suitable tables for results. They decide the level of precision needed in comparisons or measurements, and decide how to collect data that enables them to test relationships between variables. They identify and begin to explain anomalous observations and measurements and allow for these when they draw graphs. They use scientific knowledge and understanding to draw conclusions from their evidence. They consider graphs and tables of results critically. They communicate their findings and arguments using appropriate scientific language and conventions, showing awareness of a range of views.

Level	Attainment Target 2: Life processes and living things
S1	Pupils use their knowledge and understanding of basic life processes when they describe differences between living and non-living things. They use keys using fine discrimination to help them identify living things. They explain that different organisms are found in different habitats as a result of differences in environmental factors and that variation occurs between organisms of the same species. They understand that more complex feeding relationships exist between plants and animals in an appropriate habitat, and describe these relationships using food chains and food webs. They make predictions about the effect of environmental or population changes on food chains and food webs. They can name different types of soil. They understand the need plants have for ions such as magnesium and nitrates and how fertilizers can be used to improve growing conditions. They can suggest examples of both helpful and harmful activities of micro-organisms and interpret simple situations where precautionary measures would be taken to prevent transfer of micro-organisms, such as washing hands.
S2	Pupils can recognise the major organ systems of the human body and the skeleton and understand the role of each. They understand the importance of a balanced diet and healthy lifestyle in reducing the risk of health problems. They understand that living things are made of cells and that genetic material is found in the nucleus of a cell. They understand that some characteristics of living organisms are inherited. They understand that some characteristics such as plant height are affected by the environment. They understand that reproduction may be sexual or asexual and how these differ. They understand that some organisms can be genetically modified to give them new characteristics. They understand that bacteria can become resistant to antibiotics.

Level	Attainment Target 1: Scientific enquiry
S3	Pupils show knowledge and understanding of the terms DNA, gene and chromosome. They demonstrate understanding, by using examples, that some characteristics have genetic components, but that lifestyle factors can also affect these characteristics. They show knowledge and understanding of the process of selective breeding by interpreting familiar and less familiar examples. They show understanding that asexual reproduction in plants and animals produces genetically identical offspring known as clones and that developments in reproductive biology have led to cloning of mammals. They demonstrate knowledge and understanding of the principles of genetic modification and recall some of the arguments for and against genetic modification.
S4	Pupils show detailed knowledge and understanding of inheritance using Punnett squares to predict outcomes of crosses. They suggest genotypes with reference to dominant and recessive alleles. They show detailed understanding of the public debate on genetic modification by formulating a reasoned argument. They suggest examples of parental traits to incorporate into selective breeding experiments and describe the procedure used. They show knowledge and understanding of how animals are cloned and outline the procedure used. Evaluate information provided from simple secondary sources relating to developments in reproductive biology.

Level	Attainment Target 3: Materials and their properties
S1	Pupils identify a range of contexts in which changes take place. They use knowledge about how a specific mixture can be separated to suggest ways in which other similar mixtures might be separated. They suggest ways in which changes can be controlled such as speed of dissolving. They can interpret data presented in simple tables or graphs to compare solubility of different materials such as sugar or salt. They understand the composition of emulsions and foams and can give examples of each.
S2	Pupils show simple knowledge and understanding of the properties of rocks, soils and building materials, relating properties to uses. They understand the differences between elements, compounds and mixtures. They show understanding that some materials are more reactive than others. They begin to represent simple compounds using formulae.
S3	Pupils show understanding of the processes by which chemical weathering and atmospheric pollutants alter rocks and buildings over time. They use word equations to summarise reactions using conventions such as upper/lower case and subscript where appropriate with accuracy. They interpret information provided to construct a reactivity series.
S4	Pupils analyse data and discuss origins of atmospheric and water pollutants and suggest how these can be monitored and managed. They use balanced symbol equations to summarise reactions. They use the reactivity series and a particle model to predict and interpret displacement reactions of metals. They understand the law of conservation of mass and can explain why some reactions appear to lose or gain mass.

Level	Attainment Target 4: Physical processes
S1	Pupils can indicate the direction of weight, friction and upthrust on diagrams, using arrows. They understand that forces may be balanced or unbalanced and the effect this will have on the motion of an object. They can construct and interpret simple ray diagrams. They can design simple circuits and make predictions about the effect of adding or removing components. They can predict the effects of open and closed switches in series and parallel circuits. They know that current is measured in amps(A) using an ammeter.
S2	Pupils show understanding that balanced forces keep an object moving at constant speed and that unbalanced forces will change how an object moves. They can demonstrate this understanding by using directional arrows of differing or similar sizes. They understand the role of gravity in the maintenance of planetary orbits and that the strength of gravitational force can differ. They understand the uses of artificial satellites. They understand that light is part of the electromagnetic spectrum. They know that pressure is measured in N/m2 (Pa). They know that voltage is measured in volts(V) using a voltmeter. They understand the law of conservation of energy and can interpret simple energy transfers and transformations. They understand the differences between renewable and non-renewable energy sources and can give examples of each.
S3	Pupils can perform simple calculations of resultant forces. They can perform simple calculations and interpret data relating to gravity on different planets and planetary orbits. They demonstrate knowledge and understanding of the purposes and consequences of different types of orbit for artificial satellite. They understand how knowledge of the electromagnetic spectrum enables scientists to monitor events in the Solar System. They can perform simple calculations involving pressure, force and area. They show understanding of the principle of levers in simple situations. They understand how to connect a voltmeter in a circuit and can calculate unknown voltages when others are given. They use Sankey diagrams to represent and interpret a range of energy transfers.

Level	Attainment Target 1: Scientific enquiry
S4	Pupils construct and interpret speed-time graphs, describing patterns or relationships. They show detailed knowledge and understanding of the role of gravity in the formation of the Solar System and how gravity assisted trajectories can be planned. They show detailed knowledge and understanding of how models of the Solar System have changed over time and relate these changes to the evidence available. They can calculate the moment of a force giving the correct unit (Nm) and use such calculations to work out if something will balance.

Appendix B: Codes

Type of code	Use of code	Code number
Cash-in codes	The cash-in code is used as an entry code to aggregate the pupil's scores to obtain the overall grade for the test. Centres will need to use the entry codes only when entering pupils for their test.	LSC01
Entry codes	The entry codes are used to: • enter a student for assessment • aggregate the student's paper scores to obtain the overall grade for the test.	Please refer to the Edexcel *Information Manual*, available on the Edexcel website**.**

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