edexcel

Entry Level Certificate in Science

Specification

Pearson Edexcel Entry Level Certificate in Science (NSC0)

First certification from June 2017 | Issue 1

Pearson

Contents

1 Introduction

Why choose the Pearson Edexcel Entry Level Certificate in Science?

We've listened to feedback from all parts of the science community and taken this redevelopment as an opportunity to redesign the Entry Level Certificate so it complements the GCSE (9-1) Sciences, and supports every student in their enjoyment of science and success in their studies.

Our Entry Level Certificate in Science has specifically been designed to closely match the programme of study and provide a progression route to GCSE Combined Science. The certificate supports advancement in science by cementing core understanding and maximising engagement with the subject.

Co-teachability with GCSE Combined Science – key aspects of the GCSE Combined Science qualification are reflected in the Entry Level Certificate to help with co-teachability, such as careful selection of practicals and alignment of topics within the two qualifications. This ensures learners can retain the option to attempt the GCSE examinations should they progress well through the Entry Level course.

Assessments designed to encourage progression to GCSE – assessments prepare students for GCSE by drawing on key elements such as the assessment of practical skills while retaining the flavour of Entry Level with assessments can be taken at any time during the course.

Supporting you in planning and implementing this qualification

Planning

- Our **Getting Started** guide gives you an overview of the new ELC qualification to help you to get to grips with the changes to content and assessment and to help you understand what these changes mean for you and your students.
- We will give you an editable **course planner** and **scheme of work** that you can adapt to suit your department.

Teaching and learning

There will be lots of free teaching and learning support to help you deliver the new qualification including:

- a **free teacher guide** which will include information on language used at each level, more on the assessment of practical skills and general information on the structure of the qualification
- free practical support to help prepare for the changes to practical assessment.

Preparing for exams

We provide a range of support to help you prepare your students for the assessments, including:

- sample assessment materials to support formative assessment practice
- sample practical questions with commentary to help support the inclusion of practical skills in the assessments.

Get help and support

Our subject advisor service, led by Stephen Nugus and Julius Edwards will ensure that you receive help and guidance and allows you to share ideas and information with other teachers.

You can sign up to receive enewsletters from Kathryn Booth to keep up to date with qualification updates and product and service news (scienceteamupdates@pearson.com).

Find all of this and more at quals.pearson.com/ELC.

Qualification at a glance

Content and assessment overview

The Pearson Edexcel Entry Level Certificate in Science consists of six externally-set tests.

Content overview
Each of the six externally-set tests will focus on a specific area of content from the specification, shown as follows.
Paper 1: Biology 1A – Cells, genetics, inheritance and modification Cells, Genetics, Inheritance and modification
Paper 2: Biology 1B – Health, disease and the development of medicines Disease, Prevention and medicines, Health
Paper 3: Chemistry 1A – Atoms, compounds and states of matter Atomic structure, The periodic table, Ionic bonding, Covalent bonding, Metallic bonding, States of matter
Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals Methods of separating and purifying substances, Breaking down ionic compounds, Acids, Metals
Paper 5: Physics 1A – Forces, movement and energy Motion, Forces, Energy
Paper 6: Physics 1B – Waves and radiation Waves, Electromagnetic spectrum, Atoms, Radiation

Information for each test
Externally-set tests, administered and marked by the centre and moderated by Pearson*.** ***There is no set time for when each test is completed or how long the student takes to complete each test. Please see page 25 for more information. ***16.67% of the qualification*** ***25 marks***
Assessment overview Students should answer all questions. The papers consist of: multiple-choice, closed response, graphical and short-open response questions, and calculations. Calculators may be used in the test. Information on the use of calculators during the examinations for this qualification can be found in *Appendix 2: Calculators*.

2 Subject content and assessment information

The Pearson Edexcel Entry Level Certificate in Science and the Pearson Edexcel Entry Level in Further Science covers the majority of the Key Stage 4 programme of study in science.

Qualification aims and objectives

The aims and objectives of this qualification are to enable students to:

- acquire a body of basic scientific knowledge and an understanding of some important scientific ideas consistent with the programme of study
- develop basic experimental and investigative abilities
- develop a basic understanding of some of the important technological and environmental applications of science and the economic, ethical and social implications consistent with the programme of study
- develop an interest in science leading to further study at a higher level, e.g. the Edexcel GCSE in Combined Science.

Working scientifically

When studying the content across the biology, chemistry and physics topics, students should also develop the understanding and experience of working scientifically. This is detailed in full in *Appendix 3: Working scientifically*.

Co-teaching with GCSE

This qualification is designed to be co-taught with the Pearson Edexcel Level 1/Level 2 GCSE (9-1) in Combined Science. The common topic areas from the Edexcel Level 1/Level 2 GCSE (9-1) in Combined Science are B1, C1 and P1. In the content section we have added a column to show the reference to where the content links to the Edexcel GCSE in Combined Science (CS ref), where applicable.

Suggested practicals

Suggested practicals have been given at the end of relevant topics. These are not compulsory practicals but are suggested activities to improve students' practical skills. The majority of these practicals are linked to the core practicals in the Pearson Edexcel Level 1/Level 2 GCSE (9-1) in Combined Science specification. These links are shown next to the relevant suggested practical to aid co-teaching.

Sample assessment materials

A sample test and mark scheme for some of these tests can be found in the *Pearson Edexcel Entry Level Certificate in Science Sample Assessment Materials (SAMs)* document as well as on our website. This published SAMs document will contain:

- Paper 2: Biology 1B – Health, disease and the development of medicines
- Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals
- Paper 6: Physics 1B – Waves and radiation

Specimen papers

Specimen tests and mark schemes will be published and available on our website in October 2016 for:

- Paper 1: Biology 1A – Cells, genetics, inheritance and modification
- Paper 3: Chemistry 1A – Atoms, compounds and states of matter
- Paper 5: Physics 1A – Forces, movement and energy

Live materials

The live tests and mark schemes for this qualification will be published in October 2016 for:

- Paper 1: Biology 1A – Cells, genetics, inheritance and modification
- Paper 3: Chemistry 1A – Atoms, compounds and states of matter
- Paper 5: Physics 1A – Forces, movement and energy

The live tests and mark schemes for the remainder of the papers will be available from February 2017:

- Paper 2: Biology 1B – Health, disease and the development of medicines
- Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals
- Paper 6: Physics 1B – Waves and radiation

Photocopiable tests and mark schemes will be provided by Edexcel on the secure area of the website (www.edexcel.com).

Biology

Paper 1: Biology 1A – Cells, genetics, inheritance and modification

Content

Students should:		CS ref
1A.1	Describe the functions of the: a nucleus b cell membrane c cytoplasm in animal cells	1.1
1A.2	Describe the functions of the: a nucleus b cell membrane c cytoplasm d chloroplast in plant cells	1.1
1A.3	Describe how growth takes place in organisms by: a cell division in animals and plants b cell elongation in plants	2.5
1A.4	Describe the importance of cell differentiation in the development of specialised cells	2.6
1A.5	Describe how the following specialised cells are adapted to their function: a sperm cells b egg cells c nerve cells d muscle cells	1.2
1A.6	Recall the function of: a embryonic stem cells to differentiate into all cell types b adult stem cells to maintain and repair the body	2.8
1A.7	Recall the functions of the following nerve cells: a sensory neurones b relay neurones in the spinal cord c motor neurones	2.13
1A.8	Describe the role of neurotransmitters in allowing an impulse to cross a synapse	2.13
1A.9	Recall the function of the myelin sheath to insulate neurones	2.13

Students should:		CS ref
A.10	Describe the processes involved in a reflex arc, including: a receptor cells detecting a stimulus b the path taken by the impulse through sensory, relay and motor neurones c the impulse arriving at the effector	2.14
1A.11	Recall the structure of DNA as: a two strands b coiled to form a double helix	3.4
1A.12	Recall that: a DNA is found in a cell's nucleus, packaged into chromosomes b each chromosome contains several genes c a gene is a section of a DNA molecule d a gene contains the information needed to make a protein	3.5 3.13
1A.13	Define the terms allele, dominant and recessive	3.13
1A.14	Use genetic diagrams and Punnett squares to show monohybrid inheritance	3.14
1A.15	Recall that a person's sex is determined at fertilisation by the inheritance of an X chromosome from the mother, and either: a an X chromosome (in girls) or b a Y chromosome (in boys) from the father	3.15
1A.16	Recall that differences in characteristics within organisms in a species is called variation	3.20
1A.17	Describe genetic variation as the variation that arises because organisms inherit different combinations of alleles from their parents	3.20
1A.18	Recall that genetic variation mostly occurs because of small changes to the structure of DNA, known as a mutation	3.22
1A.19	Describe environmental variation as the variation that arises because an organism's environment makes it develop different characteristics	3.20
1A.20	Explain Darwin's theory of evolution by natural selection	4.2
1A.21	Describe the process of selective breeding, including: a producing wheat that is resistant to disease b producing cows with a high yield of milk	4.8
1A.22	Describe genetic engineering as a process that involves modifying the DNA of an organism to introduce desirable characteristics	4.10
1A.23	Describe the benefits and risks of genetic engineering	4.14

Suggested practicals

- Investigate reaction times.
- Investigate animal and plant cells using a light microscope (links to CS 1.6).

Paper 2: Biology 1B – Health, disease and the development of medicines

Content

Students should:		CS ref
1B.1	Describe the difference between communicable and non-communicable diseases	5.2
1B.2	Describe a pathogen as a disease-causing organism	5.4
1B.3	Recall that pathogens can be bacteria, fungi, protists or viruses	5.4
1B.4	Describe bacteria as single-cell organisms, with a: a circular chromosome of DNA, instead of a nucleus b flagellum, for movement	1.1
1B.5	Describe fungi as organisms that: a may be single-celled (yeast) or multi-cellular (mushrooms) b digest food outside the organism and then absorb it	
1B.6	Describe viruses as non-living particles that: a contain genetic material b can only reproduce inside living cells	
1B.7	Describe some common infections, including: a cholera (bacteria) – causes diarrhoea b tinea (fungus) – causes athlete's foot c malaria (protist) – causes damage to blood and liver d influenza (virus) – causes fever and cold-like 'flu' symptoms	5.5
1B.8	Describe how pathogens are spread, including: a cholera (bacteria) – water b tinea (fungus) – direct contact, or through contaminated surfaces c malaria (protists) – mosquito vector d influenza (virus) – airborne	5.6
1B.9	Describe methods for reducing or preventing the spread of pathogens, including: a simple hygiene, such as washing hands b treatment of water c control of vectors	5.6
1B.10	Describe how sexually transmitted infections (STIs) are spread through sexual contact, including: a *Chlamydia* (bacteria) b HIV (virus)	5.8

Students should:		CS ref
1B.11	Describe how STIs can be reduced or prevented by: a avoiding unprotected sexual activity b regular testing for infections	5.8
1B.12	Describe how physical barriers of the human body provide protection from pathogens, including the skin (preventing pathogens entering the body) and mucus (trapping pathogens)	5.12
1B.13	Describe how chemical defences of the human body provide protection from pathogens, including hydrochloric acid (in the stomach) and lysozymes (in tears, preventing infections through the eye)	5.12
1B.14	Describe the role of the immune system of the human body in defence against disease, including the role of: a white blood cells that ingest pathogens b white blood cells that produce antibodies c memory white blood cells in preventing reinfection	5.13
1B.15	Recall that antibiotics can only be used to treat bacterial infections	5.16
1B.16	Describe how the process of developing new medicines has many stages, including: a discovery and development b preclinical and clinical testing	5.20
1B.17	Recall that many non-communicable human diseases, such as cancer, are caused by the interaction of a number of factors, such as diet, lifestyle and genetics	5.23
1B.18	Describe cancer as the result of changes in cells that lead to uncontrolled cell division	2.4
1B.19	Describe the effect of exercise and diet on obesity	5.24
1B.20	Describe the use of BMI (body mass index) as a measure of obesity and perform simple BMI calculations	5.24
1B.21	Describe the harmful effects of smoking on the: a lungs, leading to lung cancer b heart and circulatory system, leading to cardiovascular diseases	5.24
1B.22	Recall that cardiovascular disease can be treated by: a life-long medication b surgical procedures c lifestyle changes	5.25

Suggested practical

- Investigate antimicrobial properties of plants.

Chemistry

Topics common to Paper 3: Chemistry 1A and Paper 4: Chemistry 1B

Content

Students should:		CS ref
0.1	Recall the formulae of elements and simple compounds in this specification	0.1
0.2	Write word equations	0.2
0.3	Describe the use of hazard symbols on containers to: a indicate the dangers associated with the contents b inform people about safe working precautions with these substances in the laboratory	0.5
0.4	Recognise the risks in a practical procedure and suggest suitable precautions for a range of practicals, including those mentioned in the specification	0.6

Paper 3: Chemistry 1A – Atoms, compounds and states of matter

Content

Atomic structure

Students should:		CS ref
1A.1	Describe the structure of an atom as: a a nucleus containing protons and neutrons b a nucleus surrounded by electrons arranged in shells (of the first 20 elements of the periodic table)	1.2
1A.2	Describe the nucleus of an atom as very small compared to the overall size of the atom	1.5
1A.3	Recall the relative charge and relative mass of: a a proton b a neutron c an electron	1.3
1A.4	Recall that most of the mass of an atom is concentrated in the nucleus	1.6
1A.5	Describe atoms of a given element as having the same number of protons in the nucleus and that this number is unique to that element and known as the atomic number	1.8
1A.6	Recall the meaning of the term mass number of an atom	1.7
1A.7	Recall that atoms of the same element with different numbers of neutrons are called isotopes	1.9

The periodic table

Students should:		CS ref
1A.8	Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds	1.13
1A.9	Describe how Mendeleev used his table to predict the existence and properties of some elements not then discovered	1.14
1A.10	Describe that in the periodic table elements: a are arranged in order of increasing atomic number, in rows called periods b with similar properties are placed in the same vertical columns called groups	1.17
1A.11	Identify elements as metals or non-metals according to their position in the periodic table	1.18
1A.12	Describe most metals as shiny solids that have high melting points, high density and are good conductors of electricity, whereas most non-metals have low boiling points and are poor conductors	

The periodic table (continued)

Students should:		CS ref
1A.13	Explain how the arrangement of electrons in an element is related to its position in the periodic table	1.20
1A.14	Recall that when elements react, their atoms join with other atoms to form compounds	

Ionic bonding

Students should:		CS ref
1A.15	Describe how ionic bonds are formed: a between a metal atom and a non-metal atom b by the transfer of electrons to produce positive and negative ions, including the use of dot-and-cross diagrams	1.21
1A.16	Describe the formation of ions in ionic compounds from their atoms, limited to compounds of elements in groups 1 and 7	1.24
1A.17	Describe the structure of an ionic compound as a giant structure of positive and negative ions	1.27
1A.18	Describe the properties of ionic compounds limited to: a high melting points and boiling points, because energy is needed to overcome the strong forces between the ions b solubility in water c whether or not they conduct electricity as solids, when molten and in aqueous solution	1.33

Covalent bonding

Students should:		CS ref
1A.19	Describe how a covalent bond is formed when a pair of electrons is shared between two non-metal atoms	1.28
1A.20	Recall that covalent bonding usually results in the formation of simple molecules	1.29
1A.21	Describe the formation of simple molecular, covalent substances using dot-and-cross diagrams, including: a hydrogen b hydrogen chloride c water (double bonds are not required)	1.31a, b, c
1A.22	Describe the properties of typical covalent, simple molecular compounds limited to: a low melting points and boiling points, because of weak forces between molecules (intermolecular forces) b poor conduction of electricity	1.34

Covalent bonding (continued)

Students should:		CS ref
1A.23	Recall that covalent bonding sometimes results in the formation of giant molecules	1.32
1A.24	Describe the properties of giant covalent compounds, limited to: a high melting and boiling point b poor conduction of electricity (except graphite) c insoluble in water	1.32
1A.25	Recall that graphite and diamond are different forms of carbon and that they are examples of giant covalent substances	1.35
1A.26	Describe the uses of graphite in electrodes or as a lubricant, and diamond in cutting tools, and relate them to their properties	1.36 1.37
1A.27	Describe, using poly(ethene) as the example, that simple polymers consist of large molecules containing chains of carbon atoms	1.39

Metallic bonding

Students should:		CS ref
1A.28	Describe the properties of metals, including: a the ability to conduct electricity, because of free moving electrons b malleability, because layers of metal atoms can slide over each other	1.40

States of matter

Students should:		CS ref
1A.29	Describe the arrangement and movement of particles in each of the three states of matter: solid, liquid and gas	2.1
1A.30	Recall the names used for the interconversions between the three states of matter	2.2
1A.31	Describe the changes in arrangement and movement of particles during these interconversions	2.3
1A.32	Recognise that these interconversions are physical changes, unlike chemical reactions that result in chemical changes	2.2

Suggested practical

- Investigate the typical properties of simple and giant covalent compounds and ionic compounds, such as solubility and electrical conductivity.

Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals

Content

Methods of separating and purifying substances

Students should:		CS ref
1B.1	Recall that a mixture contains two or more substances that are not chemically combined	
1B.2	Describe the experimental techniques for separation of mixtures by: a simple distillation b fractional distillation c filtration d crystallisation e paper chromatography	2.7
1B.3	Describe an appropriate experimental technique to separate a mixture, knowing the properties of the components of the mixture	2.8
1B.4	Interpret a paper chromatogram to: a distinguish between pure and impure substances b identify substances by comparison with known substances	2.10a, b
1B.5	Describe how waste and ground water can be made drinkable, including the need for sedimentation, filtration and chlorination	2.12a

Breaking down ionic compounds

Students should:		CS ref
1B.6	Describe electrolysis as a process in which electricity decomposes ionic compounds in the molten state or dissolved in water	3.23
1B.7	Recall the formation of the products in the electrolysis, using inert electrodes, of some electrolytes, including: a copper chloride solution b water acidified with sulfuric acid c molten lead bromide (demonstration)	3.25a, d, e
1B.8	Predict the products of electrolysis of other binary, ionic compounds in the molten state	3.26

Suggested practicals

- Investigate the composition of inks using simple distillation and paper chromatography (links to CS 2.11).
- Investigate the electrolysis of copper sulfate solution (links to 3.31).

Acids

Students should:		CS ref
1B.9	Recall that a neutral solution has a pH of 7, acidic solutions have lower pH values and alkaline solutions higher pH values	3.2
1B.10	Recall the effect of acids and alkalis on indicators, including litmus, pH indicator paper/universal indicator solution	3.3
1B.11	Recall that acids are neutralised by: a metals b metal oxides c metal carbonates to produce salts	3.11a, b, d
1B.12	Recall that: a hydrochloric acid produces chloride salts b nitric acid produces nitrate salts c sulfuric acid produces sulfate salts	
1B.13	Describe the chemical test for: a hydrogen b carbon dioxide (using limewater)	3.12
1B.14	Describe the process of preparing a soluble salt from an acid and an insoluble reactant, including: a excess of the reactant is added b the excess reactant is removed c the solution remaining is only salt and water d the salt is obtained by evaporation/crystallisation	3.15

Suggested practicals

- Measure the pH of everyday substances and common laboratory reagents using pH indicator paper/universal indicator (links to CS 3.6).
- Carry out tests for hydrogen and carbon dioxide.

Metals

Students should:		CS ref
1B.15	Deduce the relative reactivity of some metals by their reactions with water, acids and salt solutions	4.1
1B.16	Recall that: a most metals are extracted from ores found in the Earth's crust b unreactive metals are found in the Earth's crust as the uncombined elements	4.4
1B.17	Explain why the method used to extract a metal from its ore is related to its position in the reactivity series and the cost of the extraction process, illustrated by: a heating with carbon (including iron) b electrolysis (including aluminium) (knowledge of the blast furnace and the aluminium electrolysis cell are not required)	4.7
1B.18	Describe the uses of metals in relation to their properties, including: a aluminium b copper c gold d steel	
1B.19	Describe the advantages of recycling metals, including economic implications and how recycling can preserve both the environment and the supply of valuable raw materials	4.10

Physics

Paper 5: Physics 1A – Forces, movement and energy

Content

Motion

Students should:		CS ref
1A.1	Recall that all forces have size and direction, including friction which acts in the opposite direction to a moving object	
1A.2	Be able to use: $\text{average speed} = \frac{\text{distance}}{\text{time}}$	2.6
1A.3	Be able to relate speed to the steepness of the gradient on a distance-time graph	2.7
1A.4	Recall that large acceleration means large speed changes or small times or both	2.13
1A.5	Be able to use: $\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$	2.8
1A.6	Be able to relate acceleration to the steepness of the gradient on a speed-time graph	2.10
1A.7	Be able to relate the distance travelled to the area under a speed-time graph	2.10
1A.8	Understand relative speeds for everyday contexts such as walking, running, cycling, for a car, for a train, for an airplane and the speed of sound	2.12

Suggested practicals

- Be able to measure speed in a laboratory and in everyday situations (links to CS 2.19).
- Measure the speed of sound in air by direct methods.

Forces

Students should:	CS ref
1A.9 Recall that (unbalanced) forces cause a change of: a position b speed c shape	2.14
1A.10 Recall that the forces acting on an object are balanced or zero when the object: a is not moving b moves at constant speed	2.14
1A.11 Recall that forces cause objects to speed up or slow down	2.15
1A.12 Be able to use: weight of an object in Newton (N) = its mass in kilogram (kg) × 10	2.16
1A.13 Be able to use: the stopping distance of a vehicle = the thinking distance + the braking distance	2.28
1A.14 Recall that the stopping distance of a vehicle is changed by the: a mass of the vehicle b speed of the vehicle c driver's reaction time d condition of the vehicle's brakes and tyres e state of the road	2.29
1A.15 Recall that a driver's reaction time is increased when using drugs (medicines and alcohol) or when being distracted	2.30

Energy

Students should:	CS ref
1A.16 Be able to use: a simple Sankey diagrams b energy transfer diagrams	3.3
1A.17 Recall that energy cannot be created or destroyed	3.4
1A.18 Understand that energy can be transferred from one form to another, including when: a a vehicle slows down b water is heated by an electric kettle c a moving object hits another object	3.5

Energy (continued)

Students should:		CS ref
1A.19	Understand that energy can be wasted or lost to the surroundings when an object: a gets hot b has a resistance force acting on it	3.7
1A.20	Recall that energy lost to the surroundings is not useful energy	3.7
1A.21	Understand that every time energy is transferred, some energy is always lost to the surroundings	3.8
1A.22	Describe how to reduce unwanted energy transfers, including using lubrication or thermal insulation	3.9
1A.23	Be able to use: $\text{efficiency} = \left(\frac{\text{useful energy output}}{\text{total energy input}}\right) \times 100\%$	3.11
1A.24	Describe the main energy sources that we can use on Earth, including: a fossil fuels b nuclear fuel c biofuel d wind e hydroelectric f the tides g the Sun	3.13
1A.25	Classify sources of energy as either renewable or non-renewable	
1A.26	Explain why both renewable and non-renewable sources are used	3.14

Paper 6: Physics 1B – Waves and radiation

Content

Waves

Students should:		CS ref
1B.1	Recall that waves transfer energy and information	4.1
1B.2	Describe a wave using the terms: a frequency b wavelength c amplitude d wave speed	4.3 4.4
1B.3	Be able to use: wave speed = frequency × wavelength	4.6
1B.4	Recall that waves change direction and speed at a boundary (refraction)	4.10

Electromagnetic spectrum

Students should:		CS ref
1B.5	Recall that electromagnetic waves travel at the same speed in a vacuum	5.7
1B.6	Recall the order of electromagnetic spectrum: radio waves, microwaves, infrared, visible, ultraviolet, x-rays and gamma rays	5.10
1B.7	Describe the pattern in the frequency, wavelength and energy of waves in electromagnetic spectrum: radio waves (long wavelength, low frequency, low energy) to gamma rays (very short wavelength, very high frequency, very high energy)	5.10
1B.8	Recall that electromagnetic waves travel more slowly in some materials than in others	5.9
1B.9	Describe the harmful effects on people of excessive exposure to electromagnetic radiation, including: a microwaves – internal heating of body cells b infrared – skin burns c ultraviolet – damage to surface cells and eyes, leading to skin cancer and eye conditions d x-rays and gamma rays – mutation or damage to cells in the body	5.21

Electromagnetic spectrum (continued)

Students should:	CS ref
1B.10 Describe some uses of electromagnetic radiation a radio waves – broadcasting, communications and satellite transmissions b microwaves – cooking, communications and satellite transmissions c infrared – cooking, thermal imaging and television remote controls d visible light – vision, photography and illumination e ultraviolet – security marking (detecting forged bank notes), fluorescent lamps and disinfecting water f x-rays – observing the internal structure of objects, airport security scanners and medical x-rays g gamma rays – sterilising food and medical equipment, and the detection of cancer and its treatment	5.22

Suggested practical

- Investigate refraction in glass blocks in terms of the interaction of electromagnetic waves with matter (links to CS 5.9).

Atoms

Students should:	CS ref
1B.11 Describe the structure of an atom as: a a positively charged nucleus made up of protons and neutrons b negatively charged electrons surrounding the nucleus c most of the mass in the nucleus	6.1
1B.12 Understand that atoms of each element have the same number of protons in their nuclei	6.3
1B.13 Recall that each element has a different number of protons in the nuclei of its atoms and that this is called the atomic number	6.3
1B.14 Recall that atoms of the same element, with different numbers of neutrons, are called isotopes	6.4
1B.15 Recall that the total number of protons and neutrons in an atom is called the atomic mass	
1B.16 Recall that: a protons have a mass of 1 and a charge of +1 b neutrons have a mass of 1 and no charge c electrons have a charge of −1	6.5
1B.17 Recall that in an atom the number of protons equals the number of electrons and so the atom has no overall charge (is neutral)	6.6

Radiation

Students should:		CS ref
1B.18	Recall that when an unstable atom decays it emits an alpha particle, a beta particle or gamma rays and this is called radioactive decay	6.10
1B.19	Recall that radioactive decay is random	6.10
1B.20	Recall that when: a an alpha particle is emitted from a nucleus, the atom has become a different element b a beta particle is emitted from a nucleus, the atom has become a different element c a gamma ray is emitted from a nucleus, the atom stays the same element	6.18 6.20 6.21
1B.21	Recall that the number of radioactive decays in a second is called the activity of a radioactive source	
1B.22	Describe how the activity of a radioactive source decreases with time	6.23
1B.23	Describe how the activity of a radioactive source can be shown on a graph that never gets to zero	
1B.24	Understand that the half-life of a radioactive isotope is the time it takes for the activity to halve	6.25
1B.25	Recall that radioactive isotopes can cause cells in the body to: a be damaged b die c mutate	6.29
1B.26	Describe methods to minimise the exposure to radioactive isotopes, including: a no direct contact b increased distance from source c reduced time of exposure	6.29
1B.27	Recall that irradiation is when alpha, beta or gamma radiation passes through an object, and contamination is when an object becomes in contact with a radioactive source	6.32

Suggested practical

- Simulation of radioactive decay of different sources (link to CS 10.17).

Assessment information

The assessment for each paper is a test out of 25 marks.

Test

- Students must answer all questions.
- The test may include multiple-choice, closed response, graphical and short-open response questions, and calculations.
- The test will include questions that target mathematics, at the level of Key Stage 3 mathematics.
- The test will include questions that target practical skills.
- Calculators may be used in the test. Information regarding the use of calculators during the tests for this qualification can be found in *Appendix 2: Calculators*.
- There is no set time for when each test is completed or how long the student takes to complete each test. Please see page 4 for more information.
- The test can be sat in normal classroom conditions but other examination procedures apply, regarding invigilation and safeguards against communication between students.
- Students have the opportunity to retake the tests as many times as they like. However, no feedback or guidance on their original answers should be provided.
- There must be a gap of at least two weeks before they can retake the tests.

Master copies

- Centres will be able to download a clean master copy of each test and mark scheme from the secure area of the website (www.edexcel.com).
- These master copies must be kept confidential and must be kept under secure conditions at all times.
- Teachers will need to download a clean copy of the tests to photocopy and give to the students for them to complete each test.
- The tests and mark schemes will remain valid for the lifetime of the qualification.

Marking and moderation

- The tests are to be marked by the teacher according to the published mark scheme and moderated by Pearson.
- It is recommended that students take as many of the six tests as possible. However, students do not need to take all tests for this qualification. The minimum requirement is for the students to complete one test.
- The best marks for each test should be selected and submitted as the final marks. We will then moderate the work.
- The final marks awarded for the tests must be submitted to Pearson on the form in *Appendix 1: Assessment record and authentication sheet*, by May in the year of certification.
- The student's overall level of achievement will be based on the total marks from the tests submitted to us for moderation.
- The student's total mark out of 150 establishes the level they have achieved. See the *Level of achievement* section in this document for further information.

Assessment Objectives

Students must:		% in Entry Level Certificate
AO1	Demonstrate knowledge and understanding of scientific ideas, scientific techniques and procedures	45
AO2	Apply knowledge and understanding of scientific ideas, enquiry, techniques and procedures	40
AO3	Analyse, interpret and evaluate evidence, draw conclusions and develop experimental procedures	15
	Total	**100%**

Breakdown of Assessment Objectives

Paper	Assessment Objectives			Total for all Assessment Objectives
	AO1 %	AO2 %	AO3 %	
Paper 1: Biology 1A – Cells, genetics, inheritance and modification	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Paper 2: Biology 1B – Health, disease and the development of medicines	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Paper 3: Chemistry 1A – Atoms, compounds and states of matter	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Paper 5: Physics 1A – Forces, movement and energy	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Paper 6: Physics 1B – Waves and radiation	6–9⅓	6–7⅓	1⅓–3⅓	16⅔%
Total for Entry Level Certificate	45	40	15	**100%**

NB Totals have been rounded either up or down.

3 Administration and general information

Entries

Details of how to enter students for the examinations for this qualification can be found in our *UK Information Manual*. A copy is made available to all examinations officers and is available on our website: qualifications.pearson.com

Level of achievement

Marks for the externally-set tests are combined to give a maximum total mark of 150.

The student's total mark out of 150 then establishes the level they have achieved as shown in the table below.

The level of achievement is given below.

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

The first certification is from 2017.

Access arrangements, reasonable adjustments, special consideration and malpractice

Equality and fairness are central to our work. Our equality policy requires all students to have equal opportunity to access our qualifications and assessments, and our qualifications to be awarded in a way that is fair to every student.

We are committed to making sure that:

- students with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to students who do not share that characteristic
- all students achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Language of assessment

Assessment of this qualification will be available in English. All student work must be in English.

Access arrangements

Access arrangements are agreed before an assessment. They allow students with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

The intention behind an access arrangement is to meet the particular needs of an individual student with a disability, without affecting the integrity of the assessment. Access arrangements are the principal way in which awarding bodies comply with the duty under the Equality Act 2010 to make 'reasonable adjustments'.

Access arrangements should always be processed at the start of the course. Students will then know what is available and have the access arrangement(s) in place for assessment.

Reasonable adjustments

The Equality Act 2010 requires an awarding organisation to make reasonable adjustments where a person with a disability would be at a substantial disadvantage in undertaking an assessment. The awarding organisation is required to take reasonable steps to overcome that disadvantage.

A reasonable adjustment for a particular person may be unique to that individual and therefore might not be in the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, including:

- the needs of the student with the disability
- the effectiveness of the adjustment
- the cost of the adjustment; and
- the likely impact of the adjustment on the student with the disability and other students.

An adjustment will not be approved if it involves unreasonable costs to the awarding organisation, or affects timeframes or the security or integrity of the assessment. This is because the adjustment is not 'reasonable'.

Special consideration

Special consideration is a post-examination adjustment to a student's mark or grade to reflect temporary injury, illness or other indisposition at the time of the examination/ assessment, which has had, or is reasonably likely to have had, a material effect on a candidate's ability to take an assessment or demonstrate their level of attainment in an assessment.

Further information

Please see our website for further information about how to apply for access arrangements and special consideration.

For further information about access arrangements, reasonable adjustments and special consideration, please refer to the Joint Council for Qualifications (JCQ) website: www.jcq.org.uk

Malpractice

Candidate malpractice

Candidate malpractice refers to any act by a candidate that compromises or seeks to compromise the process of assessment or which undermines the integrity of the qualifications or the validity of results/certificates.

Candidate malpractice in controlled assessments discovered before the candidate has signed the declaration of authentication form does not need to be reported to Pearson.

Candidate malpractice found in controlled assessments after the declaration of authenticity has been signed, and in examinations **must** be reported to Pearson on a *JCQ Form M1* (available at www.jcq.org.uk/exams-office/malpractice). The completed form can be emailed to pqsmalpractice@pearson.com or posted to Investigations Team, Pearson, 190 High Holborn, London, WC1V 7BH. Please provide as much information and supporting documentation as possible. Note that the final decision regarding appropriate sanctions lies with Pearson.

Failure to report candidate malpractice constitutes staff or centre malpractice.

Staff/centre malpractice

Staff and centre malpractice includes both deliberate malpractice and maladministration of our qualifications. As with candidate malpractice, staff and centre malpractice is any act that compromises or seeks to compromise the process of assessment or undermines the integrity of the qualifications or the validity of results/certificates.

All cases of suspected staff malpractice and maladministration **must** be reported immediately, before any investigation is undertaken by the centre, to Pearson on a *JCQ Form M2(a)* (available at www.jcq.org.uk/exams-office/malpractice). The form, supporting documentation and as much information as possible can be emailed to pqsmalpractice@pearson.com or posted to Investigations Team, Pearson, 190 High Holborn, London, WC1V 7BH. Note that the final decision regarding appropriate sanctions lies with Pearson.

Failure to report malpractice itself constitutes malpractice.

More detailed guidance on malpractice can be found in the latest version of the document *General and Vocational Qualifications Suspected Malpractice in Examinations and Assessments Policies and Procedures,* available at www.jcq.org.uk/exams-office/malpractice.

Student recruitment and progression

Pearson follows the JCQ policy concerning recruitment to our qualifications in 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 students.

Prior learning and other requirements

There are no prior learning or other requirements for this qualification.

Progression

Students can progress from this qualification to:

- GCSEs in Combined Science, Biology, Chemistry, Physics
- vocational Level 1 or Level 2 qualifications such as Applied Science.

Appendices

Appendix 1: Assessment record and authentication sheet

Pearson Edexcel Entry Level Certificate in Science	**(NSC0)**
Centre name:	Centre number:
Candidate name:	Candidate number:

Test	**Mark awarded**
Paper 1: Biology 1A – Cells, genetics, inheritance and modification	**/25**
Paper 2: Biology 1B – Health, disease and the development of medicines	**/25**
Paper 3: Chemistry 1A – Atoms, compounds and states of matter	**/25**
Paper 4: Chemistry 1B – Separating mixtures, breaking down substances, acids and metals	**/25**
Paper 5: Physics 1A – Forces, movement and energy	**/25**
Paper 6: Physics 1B – Waves and radiation	**/25**
Total marks	**/150**

Teacher declaration

I declare that the work submitted for assessment has been carried out without assistance other than that which is acceptable according to the rules of the specification.

Teacher name:			
Teacher signed:		Date:	

Candidate declaration

I certify that the work submitted for assessment is my own. I have clearly referenced any sources used in the work. I understand that false declaration is a form of malpractice.

Candidate signed:		Date:	

Appendix 2: Calculators

Students may use a calculator in assessments for this qualification, and centres are responsible for making sure that calculators used by their students meet the requirements highlighted in the table below.

Students must be told these regulations beforehand and they must be familiar with them before their assessments for this qualification.

Students must have a calculator with them for their examinations which they may use.

<table>
<tr>
<td>Calculators must be:
of a size suitable for use on a desk
either battery or solar powered
free of lids, cases and covers that have printed instructions or formulae.</td>
<td rowspan="2">Calculators must not:
be designed or adapted to offer any of these facilities:
language translators
symbolic algebraic manipulation
symbolic differentiation or integration
communication with other machines or the internet
be borrowed from another candidate during an examination for any reason*
have retrievable information stored in them, and this includes:
databanks
dictionaries
mathematical formulae
text.</td>
</tr>
<tr>
<td>The candidate is responsible for:
the calculator’s power supply
the calculator’s working condition
clearing anything stored in the calculator.</td>
</tr>
</table>

*An invigilator may give a student a replacement calculator.

Appendix 3: Working scientifically

Through the content across biology, chemistry and physics, students should be taught so that they develop understanding and experience of:

1 The development of scientific thinking:

a the ways in which scientific methods and theories develop over time

b using a variety of concepts and models to develop scientific explanations and understanding

c appreciating the power and limitations of science and considering ethical issues which may arise

d explaining everyday and technological applications of science

e evaluating risks in practical science

2 Experimental skills and strategies

a using scientific theories and explanations to develop hypotheses

b planning experiments to make observations, test hypotheses or explore phenomena

c applying a knowledge of a range of apparatus to select those appropriate for experiments

d carrying out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations

e making and recording observations and measurements using a range of apparatus and methods

f evaluating methods and suggesting possible improvements and further investigations

3 Analysis and evaluation

Applying the cycle of collecting, presenting and analysing data, including:

a presenting observations and other data using appropriate methods

b translating data from one form to another

c carrying out and representing mathematical and statistical analysis

d representing distributions of results and making estimations of uncertainty

e interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions

f presenting reasoned explanations, including relating data to hypotheses

g being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility

4 Vocabulary, units, symbols and nomenclature

a developing their use of scientific vocabulary and nomenclature

b recognising the importance of scientific quantities and understanding how they are determined

c using SI units and IUPAC chemical nomenclature unless inappropriate

d using prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano)

e interconverting units

f using an appropriate number of significant figures in calculations

Appendix 4: Codes

Type of code	Use of code	Code
Regulated Qualifications Framework (RQF) codes	Each qualification title is allocated an Ofqual Regulated Qualifications Framework (RQF) code. The RQF code is known as a Qualification Number (QN). This is the code that features in the DfE Section 96 and on the LARA as being eligible for 16–18 and 19+ funding, and is to be used for all qualification funding purposes. The QN will appear on students' final certification documentation.	The QN for this qualification is: 603/0396/7
Subject codes	The subject code is used by centres to enter students for a qualification. Centres will need to use the entry codes only when claiming students' qualifications.	Entry Level – NSC0

sb140916Z:\LT\PD\EDEXCEL ENTRY LEVEL\9781446939734_ENTRY_LEVEL_SCIENCE.DOC.1–42/0

Edexcel, BTEC and LCCI qualifications

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