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Acknowledgements

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Introduction

The Edexcel International General Certificate of Secondary Education (IGCSE) in Human Biology is designed for use in schools and colleges. It is part of a suite of IGCSEs in Science offered by Edexcel (see *Appendix 1*). The course gives students the opportunity to experience human biology within the context of their general education.

The Edexcel IGCSE in Human Biology enables students to:

- study the structure and functions of human biology
- appreciate how the human organism maintains itself
- study human relationships with other animals and the dependence on plants
- learn how humans can best modify their environment and habits to produce healthy conditions for present and future populations.

About this specification

Key features and benefits of the specification

The IGCSE in Human Biology:

- includes comprehensive and detailed subject content
- includes aspects of modern human biology, appropriate for the 21st century
- includes straightforward linear assessment
- assesses investigative skills through examination.

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Specification at a glance

This Edexcel IGCSE in Human Biology comprises **two** assessments:

- Human Biology Paper 1
- Human Biology Paper 2.

Human Biology Paper 1	Paper code: 4HB0/01
<ul style="list-style-type: none">• Externally assessed• Availability: January and June series• First assessment: June 2011	66 $\frac{2}{3}$ % of the total IGCSE marks
<p>Overview of content:</p> <ol style="list-style-type: none">1 Cells and tissues2 Biological molecules3 Movement of substances into and out of cells4 Form and movement: bones, muscles and joints5 Coordination6 Nutrition and energy7 Respiration8 Gas exchange9 Internal transport10 Homeostatic mechanisms11 Reproduction and heredity12 Disease13 Non-pathogenic organisms and their importance14 Environment.	
<p>Overview of assessment:</p> <ul style="list-style-type: none">• The paper is assessed through a two-hour examination paper, set and marked by Edexcel.• The total number of marks is 120.	

Human Biology Paper 2**Paper code: 4HB0/02**

- Externally assessed
- Availability: January and June series
- First assessment: June 2011

 **$33 \frac{1}{3}$ % of the
total IGCSE
marks**

Overview of content:

- 1 Cells and tissues
- 2 Biological molecules
- 3 Movement of substances into and out of cells
- 4 Form and movement: bones, muscles and joints
- 5 Coordination
- 6 Nutrition and energy
- 7 Respiration
- 8 Gas exchange
- 9 Internal transport
- 10 Homeostatic mechanisms
- 11 Reproduction and heredity
- 12 Disease
- 13 Non-pathogenic organisms and their importance
- 14 Environment.

Overview of assessment:

- The paper is assessed through a one-hour examination paper, set and marked by Edexcel.
- The total number of marks is 60.

Qualification content

1 Cells and tissues

Students will be assessed on their ability to:

- a) Recognise cell structures as seen with a light microscope and with an electron microscope. Describe the functions of cell structures including the nucleus, cytoplasm, cell membrane, mitochondria, endoplasmic reticulum, ribosomes.
- b) Describe a DNA molecule as two strands coiled to form a double helix, the strands being linked by a series of paired bases: adenine (A) with thymine (T), and cytosine (C) with guanine (G).
- c) Understand the multiplication of cells with a simple outline description of the four stages of mitosis. Understand that division of a diploid cell by mitosis produces two cells that contain identical sets of chromosomes. Understand that mitosis occurs during growth, repair, cloning and asexual reproduction.
- d) Understand the grouping of cells into tissues: bone, muscle (voluntary, involuntary and cardiac), blood, nervous tissue and epithelium (squamous and ciliated, with reference to cells lining the cheek and trachea).
- e) Recall the organisation of cells into organs.

2 Biological molecules

Students will be assessed on their ability to:

- a) Recall the chemical elements present in carbohydrates, proteins and lipids (fats and oils).
- b) Understand the structure of carbohydrates, proteins and lipids as large molecules made up from smaller basic units: starch and glycogen from simple sugars; protein from amino acids; lipid from fatty acids and glycerol.
- c) Describe the tests for glucose, starch, lipid and protein.
- d) Explain the role of enzymes as biological catalysts in metabolic reactions.
- e) Explain the functioning of enzymes: how this can be affected by changes in temperature and pH.
- f) Describe how to carry out simple controlled experiments to illustrate how enzyme activity can be affected by changes in temperature.

3 Movement of substances into and out of cells

Students will be assessed on their ability to:

- a) Recall simple definitions of diffusion, osmosis and active transport.
- b) Understand that movement of substances into and out of cells can be by diffusion, osmosis and active transport.
- c) Understand the factors that affect the rate of movement of substances into and out of cells to include the effects of surface area to volume ratio, temperature and concentration gradient.
- d) Describe how to carry out simple experiments on diffusion and osmosis using living and non-living systems.

4 Form and movement: bones, muscles and joints

Students will be assessed on their ability to:

- a) Recall the main parts of the skeleton: axial skeleton (vertebral column, ribcage and skull), appendicular skeleton (scapula, clavicle, pelvis and limbs) and the structure of a long bone.
- b) Describe the functions of the skeleton using examples from the list above.
- c) Explain the functions of joints using the elbow, shoulder and a cartilaginous intervertebral joint as examples.
- d) Describe the structure of a synovial joint.
- e) Explain the relationship between voluntary muscles and bones to bring about movement, illustrated by the biceps and triceps muscles and associated bones in the arm and shoulder.
- f) Recall the dietary factors controlling the healthy development of muscle and bone.

5 Coordination

Students will be assessed on their ability to:

- a) Recall the structure of neurones: sensory, motor and relay.
- b) Recall the basic plan of the central nervous system.
- c) Understand the initiation of the nerve impulse receptors, direction of movement along a neuron, transfer across a synapse.
- d) Recall the structure and functions of the spinal cord.
- e) Describe the structure of the reflex arc.
- f) Recall spinal reflexes, including the knee jerk and withdrawal reflex.
- g) Recall the main areas of the brain and their functions in outline, including the cerebral hemispheres, cerebellum, mid brain, pituitary gland and hypothalamus.
- h) Recall that there are receptors that respond to heat, chemical, mechanical and light energy.
- i) Understand the integrated action of hormones from the pituitary (ADH and gonadotrophic hormones), adrenal (adrenaline) and thyroid glands, the islets of Langerhans in the pancreas (insulin and glucagons) and the gonads and recall the role of hormones in growth and development.
- j) Understand a simple comparison between the nervous and hormonal systems.
- k) Understand the concept of negative feedback as an essential characteristic of living systems with particular reference to temperature control and endocrine secretion.

Recall the following sense organs:

- l) The eye: recall the structure and function of the eye as a receptor; explain the function of the eye in focusing near and distant objects, and in responding to changes in light intensity; stereoscopic vision.
- m) The ear: recall the structure of the ear and describe its functions in balance and hearing.

6 Nutrition and energy

Students will be assessed on their ability to:

- a) Describe a balanced diet: including carbohydrates, proteins, lipids, vitamins, minerals, water and dietary fibre.
- b) Understand variations in diet related to age, pregnancy, climate and occupation.
- c) Recall the sources and functions of carbohydrates, proteins, lipids (fats and oils), vitamins A, C and D, and the mineral ions calcium and iron.
- d) Understand that energy requirements vary with activity levels, age and pregnancy.
- e) Explain the dangers to health of protein deficiency and malnutrition.
- f) Recognise the structures of the human alimentary canal and describe in outline the functions of the mouth, oesophagus, stomach, small intestine, large intestine, and pancreas.
- g) Explain how and why food is moved through the gut by peristalsis, including the role of dietary fibre in the process.
- h) Understand the role of digestive enzymes to include the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases (pepsin, trypsin) and the digestion of lipids to fatty acids and glycerol by lipases.
- i) Recall that bile is produced by the liver and stored in the gall bladder, and understand the role of bile in neutralising stomach acid and emulsifying lipids.
- j) Understand how the structure of the villus helps absorption of the products of digestion in the small intestine.
- k) Recall the types, structure and functions of teeth. Understand the factors which affect their growth. Explain how to care for teeth and gums.
- l) Describe how to carry out a simple experiment to determine the energy content in a food sample.
- m) Describe how to carry out simple experiments with digestive enzymes.

7 Respiration

Students will be assessed on their ability to:

- a) Recall that the process of respiration releases energy in living organisms.
- b) Explain the differences between aerobic and anaerobic respiration.
- c) Recall the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms.
- d) Describe how to carry out simple controlled experiments to demonstrate the evolution of carbon dioxide in respiration.
- e) Describe the breakdown and regeneration of ATP.
- f) Explain the formation of lactic acid in anaerobic respiration.

8 Gas exchange

Students will be assessed on their ability to:

- a) Recall the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes.
- b) Explain the role of the intercostal muscles and the diaphragm in ventilation.
- c) Explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries.
- d) Explain the term lung capacity, including vital capacity, tidal volume and explain spirometer traces of breathing movement.
- e) Explain the regulation of carbon dioxide and oxygen content in the blood.
- f) Understand the biological consequences of smoking in relation to the lungs and the circulatory system.
- g) Describe how to carry out simple experiments to investigate the effect of exercise on breathing in humans, including the use of limewater or bicarbonate indicator.
- h) Understand the effects of exercise and the benefits of regular exercise.

9 Internal transport

Students will be assessed on their ability to:

- a) Recall the composition of the blood: red blood cells (erythrocytes), white blood cells (phagocytes and lymphocytes), platelets and plasma.
- b) Explain the effects of genetically inherited conditions such as sickle cell anaemia (autosomal inheritance) and haemophilia (sex-linked inheritance).
- c) Understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy.
- d) Explain the adaptations of red blood cells for the transport of oxygen, including shape, structure and the presence of haemoglobin.
- e) Understand the role of white blood cells in preventing disease by ingestion of microorganisms and the production of antibodies to destroy microorganisms.

- f) Describe the role of platelets in the process of blood clotting, which prevents blood loss and the entry of microorganisms.
- g) Understand the role of ABO blood groups and their importance in blood transfusions.
- h) Understand the problems associated with transplants, including the need to avoid rejection.
- i) Recall the structure of the heart and how it functions.
- j) Explain the causes of heart attacks.
- k) Explain why the heart rate changes during exercise and under the influence of adrenaline.
- l) Recall the structure of arteries, veins and capillaries and understand their roles, including the pulse.
- m) Recall the role of tissue fluid and explain how this arises.
- n) Recall the general plan of the circulation system to include the blood vessels to and from the heart, the lungs, the liver and the kidneys.

10 Homeostatic mechanisms

Students will be assessed on their ability to:

- a) Understand that organisms are able to respond to changes in their environment.
- b) Recall homeostasis is the maintenance of a constant internal environment and that body water content and temperature and composition of the blood are examples of homeostasis.
- c) Recall the structure and functions of the skin and explain the role of sweat glands, vasoconstriction, vasodilation and shivering in temperature regulation, heat production and loss.
- d) Recall the definition of excretion; the removal of metabolic waste, including urea, carbon dioxide and water.
- e) Recall the structure and functions of the renal system and explain the formation of urine, the normal constitution of urine and understand how and why this may vary.
- f) Recall that the lungs, kidneys and skin are organs of excretion.
- g) Recall that the kidney carries out the roles of excretion and osmoregulation.
- h) Recall the structure of the urinary system including the kidneys, ureters, bladder and urethra.
- i) Recall the structure of a nephron to include Bowman's capsule, glomerulus, convoluted tubules, loop of Henlé and collecting duct.
- j) Explain the process of ultra filtration in the Bowman's capsule and describe the composition of the glomerular filtrate.
- k) Recall that water is reabsorbed into the blood from the collecting duct.
- l) Recall that selective reabsorption of glucose occurs at the proximal convoluted tubule.
- m) Describe the role of ADH in regulating the water content of the blood.
- n) Recall that urine contains water, urea and salts.
- o) Describe the value of kidney transplants and understand the problems of tissue matching to avoid rejection and the role of artificial kidneys such as dialysis machine.
- p) Explain the importance of rehydration following loss of body fluids through vomiting and diarrhoea.

- q) Describe the oral rehydration method.
- r) Describe the functions of the liver in bile production, regulation of blood sugar, urea formation and detoxification including the breakdown of alcohol.
- s) Describe the effects of excess of alcohol on the liver, nervous system and behaviour.

11 Reproduction and heredity

Students will be assessed on their ability to:

- a) Recall that the process of fertilisation involves the fusion of a male and female gamete to produce a zygote.
- b) Understand an outline of meiosis and that division of a cell nucleus by meiosis produces four cells, each with half the number of chromosomes, and that this results in the formation of genetically different haploid gametes.
- c) Recall the structure and function of the male and female reproductive systems.
- d) Understand the roles of oestrogen, progesterone, FSH and LH in the menstrual cycle and of progesterone during pregnancy.
- e) Understand the formation of a zygote from an ovum and its development into an embryo involving cell division.
- f) Explain the role of the placenta in the nutrition and gaseous exchange of the developing embryo.
- g) Explain how the developing embryo is protected by amniotic fluid.
- h) Recall the roles of oestrogen and testosterone in the development of secondary sexual characteristics.
- i) Describe the birth process and explain the advantages of breast feeding.
- j) Describe an outline of growth and development to maturity.
- k) Describe the methods of contraception by hormonal, barrier and natural methods, intra-uterine devices and sterilisation. Explain the advantages and disadvantages of each method and describe methods to improve chances of fertilisation.
- l) Recall that the nucleus of a cell contains chromosomes on which genes are located.
- m) Recall that a gene is a section of a molecule of DNA.
- n) Recall that genes exist in alternative forms called alleles which give rise to differences in inherited characteristics.
- o) Recall the meaning of the terms dominant, recessive, homozygous, heterozygous, phenotype, genotype, codominance, diploid and haploid.
- p) Understand the inheritance of the ABO blood groups and recall the terms multiple alleles and codominance.
- q) Understand patterns of monohybrid inheritance using a genetic diagram.
- r) Understand how to interpret family pedigrees.
- s) Understand how to predict probabilities of outcomes from monohybrid crosses, including cystic fibrosis and sickle cell anaemia.
- t) Recall that the sex of a person is controlled by one pair of chromosomes, XX in a female and XY in a male.

- u) Explain how to determine the sex of offspring at fertilisation, using a genetic diagram.
- v) Understand the pattern of sex-linked inheritance, including haemophilia and red-green colour blindness.
- x) Understand that random fertilisation produces genetic variation of offspring.
- y) Recall that the diploid number of chromosomes is 46 and the haploid number is 23.
- z) Understand that variation within a species can be genetic, environmental or a combination of both.
- aa) Recall that mutation is a rare, random change in genetic material that can be inherited.
- bb) Recall that many mutations are harmful but some are neutral and a few are beneficial.
- cc) Understand that mutant organisms can increase in a population by natural selection.
- dd) Recall that the incidence of mutations can be increased by exposure to ionising radiation (for example gamma rays, x-rays and ultraviolet rays) and some chemical mutagens (for example chemicals in tobacco).

12 Disease

Students should know what the main effects of the diseases mentioned in this section are but a detailed knowledge of symptoms is not required.

Students will be assessed on their ability to:

- a) The general course of a disease.
 - (i) Recall the methods of infection, incubation, signs and symptoms.
 - (ii) Understand the difference between endemic and epidemic diseases.
- b) Diseases caused by pathogenic microorganisms.
 - (i) **Viruses:** recall a brief description of their structure and reproduction. Recall methods of transmission, treatment and prevention of spread of influenza, poliomyelitis and AIDS (Human Immuno-deficiency Virus — HIV).
 - (ii) **Bacteria:** recall a brief description of their structure, nutrition and reproduction.
 - (iii) **Bacteria as pathogens:** recall methods of transmission, treatment and prevention of spread of typhoid, tuberculosis and gonorrhoea.
 - (iv) **Fungi:** recall methods of transmission, treatment and prevention of spread of thrush and athlete's foot.
- c) Diseases caused by other parasites.
 - (i) **The parasite schistosoma:** recall its nutrition and life cycle.
Recall the worldwide effects of the disease schistosomiasis (Bilharzia.), including methods of preventing its spread.
 - (ii) **Understand the relationships between:** mosquito and malarial parasite; housefly and typhoid bacillus.
- d) Explain the role of these vectors in transmitting causative agents of disease and the treatment and prevention of spread of the disease and its vector.

- e) Defence
 - (i) **Immunity:** understand that it can be natural and artificial, both active and passive, with reference to diseases.
 - (ii) **Vaccines:** explain what a vaccine is and how it works.
 - (iii) Understand the antibody/antigen reaction.
 - (iv) Recall the sources and role of **antibiotics**.

13 Non-pathogenic organisms and their importance

- a) Understand the role of non-pathogenic bacteria and fungi useful to humans in the decomposition of organic matter.
- b) Recall the processes of sewage treatment in a modern sewage works and in a pit latrine. Explain the role of aerobic and anaerobic microorganisms in sewage breakdown.

14 Environment

- a) Understand the relationship between humans and their environment.
- b) Explain the dependence on green plants for supplies of food and oxygen.
- c) Recall a simple word equation to summarise the process of photosynthesis.
- d) Recall the names given to different trophic levels to include producers, primary, secondary and tertiary consumers and decomposers.
- e) Describe the transfer of substances and of energy along a food chain.
- f) Understand that only about 10 percent of energy is transferred from one trophic level to the next.
- g) Understand the hygienic methods of food preparation, storage and preservation.
- h) Understand the scientific principles used in the purification, distribution and storage of water.
- i) Understand the biological consequences of pollution of water by untreated sewage including increases in the number of microorganisms causing depletion of oxygen.
- j) Explain how eutrophication can result from leached minerals from excess nitrogen fertiliser or treated sewage.
- k) Understand the consequences of pollution of air by sulphur dioxide and carbon monoxide.
- l) Recall that water vapour, carbon dioxide, nitrous oxide, methane and CFCs are greenhouse gases.
- m) Explain how human activities contribute to greenhouse gases.
- n) Explain that an increase in greenhouse gases results in an enhanced greenhouse effect and that this may lead to global warming and its consequences.
- o) Understand the effects of deforestation including leaching, soil erosion, disturbance of the water cycle and the balance in atmospheric oxygen and carbon dioxide.
- p) Understand the hazards of ultraviolet light, x-rays and other ionising radiation.

Assessment

Assessment summary

Human Biology Paper 1

This paper will assess human biology in the context of all Assessment Objectives. All content will be assessed in this paper and the paper will focus on the core knowledge of the specification. There will be a range of compulsory short-answer, structured questions in paper 1 which are ramped to ensure accessibility for less-able students, as well as to stretch more-able students. The maximum mark for this paper will be 120.

Human Biology Paper 2

This paper will assess human biology in the context of all Assessment Objectives. All content will be assessed in this paper. The paper will focus on investigation and the analysis of data. The maximum mark will be 60.

In both papers, students may be required to perform calculations, draw graphs and describe, explain and interpret biological phenomena. Some of the question content will be unfamiliar to students; these questions are designed to assess data-handling skills and the ability to apply biological principles to unfamiliar information. Questions targeted at grades A* – B will include questions designed to test knowledge, understanding and skills at a higher level, including some questions requiring longer prose answers.

Summary of table of assessment

Human Biology Paper 1	Paper code: 4HB0/01
<ul style="list-style-type: none">• Externally assessed• Availability: January and June series• First assessment: June 2011	
Human Biology Paper 2	Paper code: 4HB0/02
<ul style="list-style-type: none">• Externally assessed• Availability: January and June series• First assessment: June 2011	

Assessment Objectives and weightings

A01 Knowledge and understanding

In the examination, students will be tested on their ability to:

- recognise, recall and show understanding of specific biological facts, terminology, principles, concepts and practical techniques, including aspects of safety
- draw on existing knowledge to show understanding of the ethical, social, environmental, economic and technological applications and implications of biology
- select, organise and present relevant information clearly and logically, using appropriate vocabulary.

A02 Application of knowledge and understanding, analysis and evaluation

In the examination, students will be tested on their ability to:

- describe, explain and interpret phenomena, effects and ideas in terms of biological principles and concepts, presenting arguments and ideas clearly and logically
- interpret and translate data presented as continuous prose or in tables, diagrams, drawings and graphs, from one form to another
- carry out relevant calculations
- apply biological principles and concepts in solving problems in unfamiliar situations, including those related to the ethical, social, economic and technological applications and implications of biology
- assess the validity of biological information, experiments, inferences and statements and make informed judgments from them.

A03 Investigative skills

In the assessment of these practical skills, students will be tested on their ability to:

- devise and plan investigations, drawing on biological knowledge and understanding in selecting appropriate techniques
- demonstrate or describe appropriate experimental and investigative methods, including safe and skilful practical techniques
- make observations and measurements with appropriate precision, record these methodically and present them in a suitable form
- analyse and interpret data to draw conclusions from experimental activities which are consistent with the evidence, using biological knowledge and understanding, and communicate these findings using appropriate specialist vocabulary, relevant calculations and graphs
- evaluate data and methods.

	% in IGCSE
AO1: Knowledge and understanding	45–55%
AO2: Application of knowledge and understanding, analysis and evaluation	25–35%
AO3: Investigative skills	20%
TOTAL	100%

Relationship of Assessment Objectives to Papers for IGCSE

Paper number	Assessment Objective			Total for AO1, AO2 and AO3
	AO1	AO2	AO3	
Paper 1	30–36%	17–23%	$13 \frac{1}{3} \%$	$66 \frac{1}{3} \%$
Paper 2	15–19%	8–12%	$6 \frac{2}{3} \%$	$33 \frac{2}{3} \%$
Total for IGCSE	45–55%	25–35%	20%	100%

Entering your students for assessment

Student entry

Details of how to enter students for this qualification can be found in Edexcel's *International Information Manual*, copies of which (in CD format) are sent to all active Edexcel centres. The information can also be found on Edexcel's international website:
www.edexcel-international.org/sfc/academic/infomanual

Combinations of entry

There are no forbidden combinations.

Access arrangements and special requirements

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

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

- the Joint Council for Qualifications (JCQ) 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 WC1V 7BH

Assessing your students

The first assessment opportunity for Paper 1 and Paper 2 of this qualification will take place in the June 2011 series and in each January and June series thereafter for the lifetime of the specification.

Your student assessment opportunities

Paper	June 2011	Jan 2012	June 2012	Jan 2013
Human Biology Paper 1	✓	✓	✓	✓
Human Biology Paper 2	✓	✓	✓	✓

Awarding and reporting

The grading, awarding and certification of this qualification will follow the processes outlined in the current GCSE/GCE Code of Practice for courses starting in September 2009, which is published by the Qualifications and Curriculum Authority (QCA). The IGCSE qualification will be graded and certificated on an eight-grade scale from A* to G. Individual unit results will be reported.

Students whose level of achievement is below the minimum standard for Grade G will receive an unclassified U. Where unclassified is received it will not be recorded on the certificate.

The first certification opportunity for the Edexcel IGCSE in Human Biology will be 2011.

Students whose level of achievement is below the minimum judged by Edexcel to be of sufficient standard to be recorded on a certificate will receive an unclassified U result.

Language of assessment

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

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the JCQ's *Suspected Malpractice in Examinations: Policies and Procedures* document on the JCQ website www.jcq.org.uk.

Student recruitment

Edexcel's access policy concerning recruitment to our qualifications 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 students.

Progression

This qualification supports progression to:

- the human biology content of Edexcel GCE Advanced Subsidiary and Advanced Level in Biology
- Edexcel Level 3 BTEC Nationals in Applied Sciences.

Grade descriptions

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

Grade A

Candidates can:

- recall a wide range of knowledge from all areas of the specification
- use detailed scientific knowledge and understanding in a range of applications relating to scientific systems or phenomena. For example, they explain how temperature or water content is regulated in humans
- draw together and communicate knowledge from more than one area, use scientific or mathematical conventions routinely in support of arguments and use a wide range of scientific and technical vocabulary throughout their work
- use scientific knowledge and understanding to select an appropriate strategy for a practical task, identifying the key factors to be considered. They make systematic observations and decide which observations are relevant to the task in hand. When making measurements they decide the level of precision needed and can recall or use a range of apparatus to make appropriately precise measurements. They select a method of presenting data appropriate to the task. They use information from a range of sources where it is appropriate to do so. They identify and explain anomalous observations and measurements and the salient features of graphs
- use scientific knowledge and understanding to identify and explain patterns and draw conclusions from the evidence by combining data of more than one kind or from more than one source. They identify shortcomings in evidence, use scientific knowledge and understanding to draw conclusions from their evidence and suggest improvements to the methods used that would enable them to collect more reliable evidence.

Grade C

Candidates can:

- recall a range of scientific information from all areas of the specification. For example, they explain how the lungs are ventilated
- use and apply biological knowledge and understanding in some general contexts
- describe links between related phenomena in different contexts. Use diagrams, charts and graphs to support arguments. Use appropriate scientific and technical vocabulary in a range of contexts
- use scientific knowledge and understanding to identify an approach to a question. For example, identifying key factors to vary and control. Candidates can recall a range of apparatus to make careful and precise measurements and systematic observations and recognise when it is necessary to repeat measurements and observations. They present data systematically, eg in graphs, and use lines of best fit. Candidates identify and explain patterns within data and draw conclusions consistent with the evidence. They explain these conclusions using scientific knowledge and understanding and evaluate how strongly their evidence supports the conclusions.

Grade F

Candidates can:

- recall a limited range of information. For example, they state the main functions of organs of the human body
- use and apply knowledge and understanding in some specific everyday contexts. For example, they describe how the heart rate increases with exercise
- make some use of scientific and technical vocabulary and make simple generalisations from information
- devise fair tests in contexts which involve few factors. They can recall or use simple apparatus to make measurements appropriate to the task and record observations and measurements in tables and graphs. Candidates obtain information from simple tables, charts and graphs and identify simple patterns. They offer explanations consistent with the evidence obtained.

Support and training

Edexcel support services

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

ResultsPlus — ResultsPlus is an application launched by Edexcel to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in ‘one-click’. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit www.edexcel.org.uk/resultsplus.

Ask the Expert — Ask the Expert is a new service, launched in 2007, that provides direct email access to senior subject specialists who will be able to answer any questions you might have about this or any other specification. All of our specialists are senior examiners, moderators or verifiers and they will answer your email personally. You can read a biography for all of them and learn more about this unique service on our website at www.edexcel.org.uk/asktheexpert.

Ask Edexcel — Ask Edexcel is Edexcel’s online question and answer service. You can access it at www.edexcel.org.uk/ask or by going to the main website and selecting the Ask Edexcel menu item on the left.

The service allows you to search through a database of thousands of questions and answers on everything Edexcel offers. If you don’t find an answer to your question, you can choose to submit it straight to us. One of our customer services team will log your query, find an answer and send it to you. They’ll also consider adding it to the database if appropriate. This way the volume of helpful information that can be accessed via the service is growing all the time.

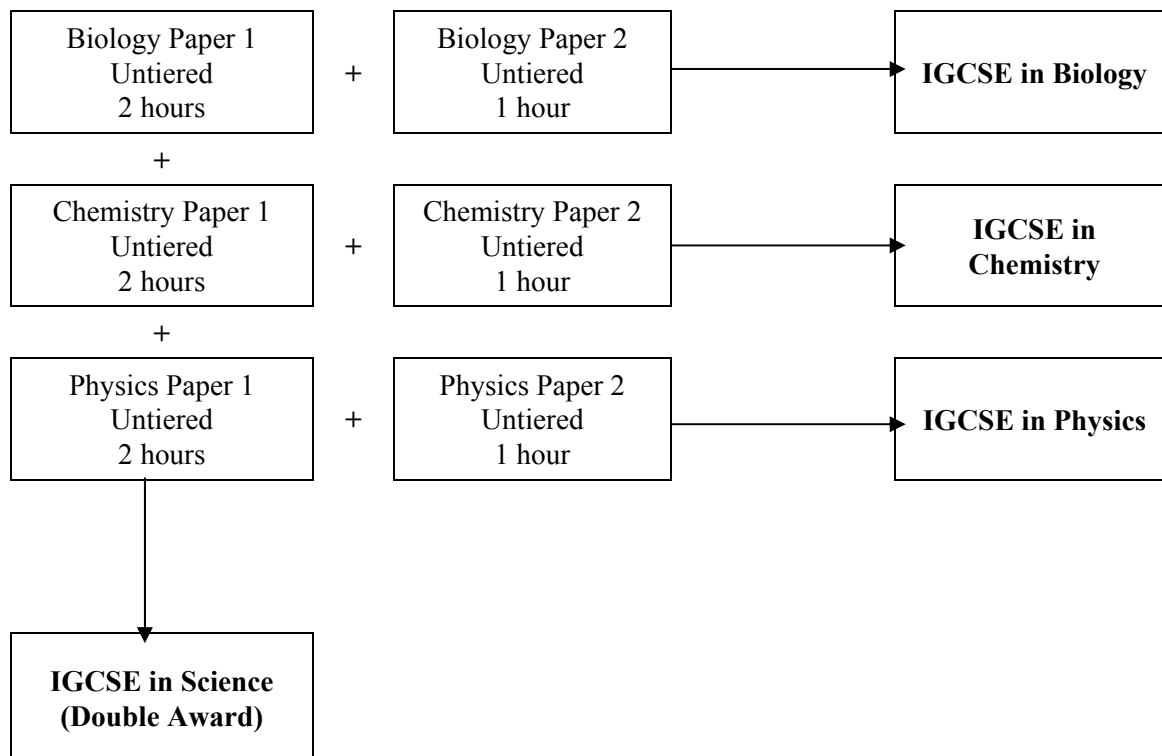
Examzone — The Examzone site is aimed at students sitting external examinations and gives information on revision, advice from examiners and guidance on results, including re-marking, re-sitting and progression opportunities. Further services for students — many of which will also be of interest to parents — 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.org.uk.

Appendix 1: Qualifications available from Edexcel IGCSE Science

The relationship of assessment to the qualifications available is shown below.



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For more information on Edexcel and BTEC qualifications
please visit our website: www.edexcel.org.uk

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