CAMBRIDGE ADVANCED NATIONALS

OCR
Oxford Cambridge and RSA

L3 Cambridge Advanced Nationals (AAQ)

Applied Science & Human Biology

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Meet your subject advisor

Agenda

- What makes Cambridge Advanced Nationals the best qualification for your school?
- What is unique about OCR’s science AAQs?
- What are the benefits to students from studying a Cambridge Advanced National in Applied Science or Human Biology?

Important links

- Draft specifications and sample assessment materials
- Timeline of defunding
- Upcoming Webinars, all subjects

Talk to us 1:1

or invite us to your centre: ocr.vqscience@ocr.org.uk

Benefits of Cambridge Technicals with OCR

Simple, supportive, straight-forward moderation process:

- Same moderator for three years, dedicated principal moderator; quality relationships
- Two “claims” when you are ready, designed to allow flexible delivery
- In-person or virtual visit to review the units; assess students when they’re ready
- Final entry of marks by June 15th
- Guidance on what needs to improve, if necessary, from the moderator on the day
- No compulsory training or submission of curriculum plans/assignment briefs; minimal paperwork – use existing internal processes
- Opportunity for students to improve and resubmit work

To talk with me more about our Cambridge Technicals in Applied Science just email ocr.vqscience@ocr.org.uk

Meaningful changes

What is new in the Cambridge Advanced Nationals?

We have taken the opportunity to make meaningful changes that give teachers greater confidence in marking and reward students for the skills they are able to demonstrate.

- Full compensation
- Designed with teachers and universities
- Support and resources
- 2-year assignment life span
- Complement A-Levels
- Mixed curriculum suggestions
- Clear and granular assessment criteria
- Focus on the application of knowledge
- Larger sizes where possible

Compensation at unit level

Hurdles based model

P1	M1	D1
P2	M2	D2
P3	M3	
P4		

In the hurdles-based model above, the student would fail to achieve a pass grade for the unit.

Compensation based model

P1	M1	D1
P2	M2	D2
P3	M3	
P4		

Using our new compensation-based model, the same student would still achieve a result for the unit.

Boundaries* for each unit can be found in the specification. The example above is simplified for illustration.

Expanded unit level example

An example of a 50GLH unit in our new Cambridge Advanced Nationals

Total number of criteria: **24** (12 Pass, 7 Merit, 5 Distinction)

Total required for a **Unit Pass: 10**
Total required for a **Unit Merit: 15**
Total required for a **Unit Distinction: 20**

The total required for a Pass, Merit or Distinction can come from any unit criteria (e.g., 8 pass, 2 merit and 2 distinction would result in an overall unit Pass)

*Boundaries will be reviewed over time

Full compensation model in Cambridge Advanced Nationals

Pass	Merit	Distinction
P1: Interpret the scan image to identify those regions of the brain likely to be affected by the TBI.	**M1: Evaluate** the advantages and disadvantages of using different scanning techniques for the diagnosis of the TBI in the case study.	**D1: Justify** why an EEG should be used to confirm the impact of the TBI on nerve impulse transmission in the patient's brain.
P2: Draw a fully annotated low-power plan diagram to show parts of the brain anatomy affected by the TBI.		
P3: Use research to **describe** how the patient's symptoms relate to the TBI in the case study.	**M2: Describe** the wider impact of the patient's injuries on their physical and mental wellbeing.	**D2: Explain** whether the spinal cord and nerves are affected by the TBI in the case study.

Pass	Merit	Distinction
P4: Use research to **describe** how a range of relevant potential treatments could be appropriate for the TBI patient.	**M3: Evaluate two** physical treatments and **two** psychological treatments which are needed to aid recovery of the patient.	**D3: Analyse** how the options chosen for pain management affect the patient on a cellular level.
P5: Create a logical treatment plan, containing all key components to meet the physical, psychological and personal needs of the patient.		
P6: Design a relevant schedule for drug prescription for the TBI patient.		
P7: Describe what contributions are required to be made by the specialists and non-specialists involved in the treatment plan.	**M4: Discuss** the use of different teams of healthcare professionals to support the patient.	

Pass	Merit	Distinction
P8: Create an appropriate presentation of the treatment plan for the specialists identified in **Task 2**.	**M5: Explain** the most appropriate way for scientific terminology used in the presentation for the specialists to be communicated with the non-specialists.	**D4: Justify** the content of the presentation by detailing the scientific reasoning behind its inclusion.
P9: Suggest four adaptations to the presentation so that it can be used to communicate the treatment plan to the non-specialists in the case study effectively.	**M6: Explain** the adaptations suggested to the presentation in **P9** so that the non-specialists in the case study can understand their contribution to the treatment plan.	
P10: Draw a simplified low power plan diagram to show parts of the brain anatomy affected by the TBI for the non-specialists in the case study.		

Pass	Merit	Distinction
P11: Summarise the feedback received for your treatment plan.	**M7: Assess** the strengths and weaknesses of the information used in the creation of treatment plan for the TBI patient.	**D5: Justify** any potential improvements to the information used in the creation of treatment plan for the TBI patient.
P12: Analyse the strengths and weaknesses of the materials created to present information to the specialists and suggested adaptations for the non-specialists.		

Performance Objectives

PO1 is assessed in the externally assessed unit only.
PO4 is assessed in the NEA units only.

PO1	Show knowledge and understanding
PO2	Apply knowledge and understanding
PO3	Analyse and evaluate knowledge, understanding and performance
PO4	Demonstrate and apply skills and processes relevant to the subject

Pass	**Merit**
P1: Describe the stages of meiosis	M1: Explain the importance of meiosis

Pass	**Merit**
P1: Use research to **summarise** DNA function for someone with the genetic disorder.	**M1:** Use research to **compare** the functioning gene/chromosome to the malfunctioning gene/chromosome for the genetic disorder.
P2: Use research to **explain** how genes determine the signs and symptoms of the genetic disorder.	**M2:** Use research to **describe** how gene expression and gene regulation contribute to the genetic disorder.

Cambridge Advanced Nationals (AAQs)

OCR
Oxford Cambridge and RSA

Key: M Mandatory unit | O Optional unit | E Examined assessment | NEA Non-examined assessment

Applied Science

- Fundamentals of Science — M, E
- Science in Society — M, E
- Investigating Science — M, NEA
- Environmental Science — O, NEA
- Analytical Techniques in Chemistry — O, NEA
- Forensic Biology — O, NEA
- Medical Physics — O, NEA

Human Biology

- Fundamentals of Human Biology — M, E
- Health and Disease — M, E
- Genetics — M, NEA
- Biomedical Techniques — M, NEA
- Human Reproduction — O, NEA
- The Brain — O, NEA
- Nutrition and Metabolism — O, NEA
- Drug Development — O, NEA

Accessible and Inclusive

External assessments: Strong focus on accessibility

- Paper 1: Mixture of mcqs, short answer, calculations and extended response (**up to** 4 marks)
- Paper 2: Mixture of mcqs, short answer, calculations and extended response (**one** 6 mark and **one** 9 mark question)

- Ramping within questions and within the paper, building up to extended responses
- Pre-release for Paper 2, Science in Society for Applied Science, 6 weeks before exam (~50% of marks)
- Maximum 1 hour 30 minutes for any exam paper.
- Resit opportunities in January and June – best mark taken forward
- No near-pass necessary – full compensation model means that failing the paper **does not** prevent a student passing the qualification.

Multiple choice questions: not easier, just different

(ii) Pea proteins have a secondary level of organisation.

What is the secondary level of organisation in proteins?

Tick (✓) **one** box.

Folding of a single polypeptide chain to form an α-helix or β-pleated sheet ☐

More than one polypeptide chain folded to form a 3D shape ☐

The sequence of amino acids in a polypeptide chain ☐

3D folding of a single polypeptide chain due to side-chain interactions ☐

[1]

Accessible Questions in F180

(ii) Some structures seen in the cyanobacteria cell in the diagram share the same function with components found in a chloroplast.

Complete the table to match the function of structures seen in the cyanobacteria cell to the component found in a chloroplast.

Component found in a chloroplast	Structure seen in the cyanobacteria cell
Outer membrane	
Stroma	
Thylakoids	

[3]

Extended responses – maximum 4 marks on paper 1

(c) Explain how nuclear radiation can damage DNA indirectly.

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..... **[4]**

Assessment of Mathematical and Practical Skills

Mathematical skills and How Science Works opportunities mapped throughout the specification just like our GCSEs and A levels

(b) The scientists estimate that normal sperm cells contain 60 mitochondria in the middle piece.

The table shows relatively lower numbers of mitochondria found in a sample of abnormal sperm cells.

41	32	42	49	27
46	35	44	48	37

(i) Calculate the mean number of mitochondria found in the abnormal sperm cells.

Mean number of mitochondria = ... **[1]**

Inclusive language and support for teachers

- Reviewed by a range of stakeholders with an EDI focus to ensure the content, exemplification and assessment materials represent everyone studying these qualifications
- Our assessments follow our EDI policies to reduce stereotype threat

- Access to textbook and digital resources
- Candidate style exemplars
- Schemes of work
- Annotated SAMs
- E-learning course
- Practice papers

What has been the response so far?

Endorsements from Universities

A condition of submission was to provide 6 letters of support from HEIs.
We secured a total of 14 letters from universities, including those in the Russell Group, who would accept these science AAQs along with appropriate A levels as part of admission.

Applied Science

- Aston University
- Cardiff University
- Coventry University
- Leeds
- Nottingham Trent University
- Staffordshire University
- Teeside University
- UEA
- University of Bradford
- University of Gloucestershire
- University of Lincoln
- University of Manchester
- University of Southampton
- UWE Bristol

Human Biology

- Aston University
- Cardiff University
- Coventry University
- Nottingham Trent University
- Staffordshire University
- Teeside University
- UEA
- University of Bradford
- University of Gloucestershire
- University of Lincoln
- University of Manchester
- University of Southampton
- UWE Bristol

From teachers and assessors:

- Adequate time to complete the external examinations
- Exam papers are well thought through
- NEA tasks appropriate for this level and appropriate time available to complete them
- There is a good allocation of time shared between the supervised and unsupervised time
- Assignments are very well written and logical, focussing on key skills needed to successfully carry out scientific experimentation
- No additional, specialist scientific equipment required

"I think this will help students understand how to begin researching science and to experience what it means to be scientist"

"This will set them up well for further studies"

"I want to emphasise that I had very little to write as I thought this was a well thought out assignment that is interesting and relevant to the assessment objectives. If I was teaching this unit, I would be very happy."

"The scenario is very suitable for level 3 students and will help them to appreciate the variety of understanding needed to work within a science setting."

Why choose a Cambridge Advanced National in Applied Science or Human Biology?

Advantages of a science Cambridge Advanced National

- Designed with existing science teachers in mind
- Practical assignments reviewed and approved by CLEAPSS
- Endorsed by Field Studies Council
- Designed with accessibility and ‘appliedness’ as central tenets
- 60% of the final grade is based on internally-assessed coursework
- Two exam seasons per year, multiple resit opportunities
- Students develop a wider range of skills that are vital for progression to higher education and professions
- Applied qualifications designed to sit alongside an A-Level curriculum and provide students with [different from A-Level] skills valued by HEI
- Optional units to allow teachers to customise the curriculum to meet student and local needs
- Created with professionals from: Institute of Biomedical Sciences, Chartered Society of Forensic Science, NHS medical physicists, Diverse Educators, alongside our team of experienced developers and assessors.

What about progression to HEIs?

Examples of applied courses that accept Cambridge Technicals currently

- Applied Biosciences with foundation year Biomedical Sciences
- Pharmacy and Bioengineering
- Diagnostic Radiography
- Nursing and Midwifery
- Paramedic Science
- Speech and Language Therapy
- Sport Coaching and Physical Education

- In 2019/20 there were 665 applications to 64 Universities from students with a Cambridge Technical in Applied Science.
- There were 455 offers made by HEIs
- Students applied to 10 Russell Group Universities

What else will these qualifications aim to support?

- Understanding and awareness of the scientific method and working scientifically skills
- The development of communication skills and the use of ICT
- Direct transition from GCSE knowledge and understanding
- Alignment in language and assessment style with GCSE and A level science qualifications
- Appreciation and emphasis of the mathematical skills already highlighted at GCSE
- Inclusive, accessible, and appropriate assessments
- Emphasis on practical skills where appropriate – mandatory practical coursework for both AAQs

Pairing with the new Applied courses

What might students study alongside these two new courses?

Applied Science

Human Biology

OCR
Oxford Cambridge and RSA

What is in OCR's Cambridge Advanced Nationals in Applied Science and Human Biology?

Activity: 10 minutes to explore the SAMs and specification content

Summaries are available on the remaining slides

Then we'll take questions

APPLIED SCIENCE

Applied Science

Structure and Units for Extended Certificate, 360GLH

Total: 5 Units
3 mandatory
2 x EA
1 x NEA

Fundamentals of Science, 90 GLH

Science in Society, 60 GLH

Investigating Science, 90 GLH

optional units
60 GLH
choose 2
NEA

Analytical techniques in Chemistry

Medical Physics

Environmental Studies

Forensic Biology

*2 mandatory units for Certificate, 180 GLH

F180 Fundamentals of Science – 1 hour 30 minutes, 70 marks

Parity with A level sciences, foundation knowledge for the NEA units
20 marks for each science area, 10 marks from Section D – practicals 1-6
Mixture of mcqs, short answer, calculations and extended response (up to 4 marks)

Biology

- Cell structure and microscopy
- Bioenergetics
- Structure and function of biological molecules
- Biodiversity and ecosystems

Chemistry

- Atomic structure and the Periodic Table
- Quantitative chemistry
- Structure and bonding
- Rates of reactions and enthalpy changes

Physics

- Electricity
- Motion
- Medical physics

Level of Response – 9 marks

4 You have been asked to recommend some scientific articles for sixth form science students.

The articles should be:

- valid
- effective at providing accurate information
- engaging for the students

Discuss whether **Source A** and **Source B** would be appropriate articles for the student. In your answer you **must** write about:

- The ways that **Source A** and **Source B** are appropriate articles for the students.
- The ways that **Source A** and **Source B** are not appropriate articles for the students.
- Whether you would recommend **Source A** and **Source B** to the students **and** your reasons.

F181 Science in society – 1 hour 15 minutes, 50 marks

Section A based on a pre-release (23-27 marks), Section B from the specification content of F181 (23-27 marks)
Mixture of mcqs, short answer, calculations and extended response (one 6 mark and one 9 mark question)

What scientists do

- The skills of scientists
- The scientific method
- The scientific community
- The role of scientists

Handling scientific data

- Types of scientific data
- Collecting scientific data
- Storage and presentation of scientific data
- Interpreting data

Scientific developments

- Hypothesis, theory, and law
- Using new technologies in science
- Implications and limitations of scientific developments

Communicating science

- Methods of communication
- Plagiarism
- Using science to inform to inform decision making
- Problems with communicating science

F182 Investigation science – 90 GLH NEA

- Create a research question

Planning a scientific investigation

- Researching the topic
- Designing a scientific investigation
- Conducting preliminary experiments

Performing a scientific investigation

- Practical skills and apparatus
- Recording data from experiments

Analysing and communicating results

- Analysing data
- Writing conclusions
- Communicating results

Evaluating a scientific investigation

- Evaluating the investigation

Set Assignment, 3 titles, last 2 years, new set each year

- Create a research question
- Construct a hypothesis and prediction
- Plan an investigation, with preliminary testing and risk assessment
- Carry out investigation, collect, analyse and present data
- Explain limitations of data, evaluate sources of secondary data
- Present and defend conclusions

SET A

How vitamin C concentration varies in foods

How the temperature affects the rate of a reaction

How the surface a ball is dropped onto affects the bounce of the ball

Optional NEA units – choose 2

One set assignment, 2-year lifetime, new one released each year
35-40 hours teaching, 20-25 hours assignment

F183: Analytical techniques in chemistry

- Techniques to categorise and separate chemical substances
- Quantitative and qualitative analytical techniques to quantify and identify substances
- The principles of spectroscopic techniques and interpreting spectra for chemical substances

F184: Environmental studies

- Ecosystems and biodiversity
- Impact of human activity and natural events
- Waste management
- Environmental management and conservation
- Fieldwork

F185: Forensic biology

- Forensic biology disciplines and evidence
- Cells, Tissues and Organs in Forensic Biology
- Investigation and Evidence Collection
- Analytical Techniques and Evidence Interpretation

F186: Medical Physics

- Application of non-ionising diagnosis techniques
- Application of ionising diagnosis techniques
- Application of ionising therapy techniques
- Application of non-ionising therapy techniques
- Planning for diagnosis and therapy

Scenarios change, everything else stays the same

Unit F185: Forensic Biology

Scenario Title: Who took the tomatoes?

Scenario

Sam grows prize tomatoes in a greenhouse. Sam finds that the greenhouse has been broken into. The tomato plants have been damaged and many are missing. Blood is on broken plant pots and broken glass. A half-eaten tomato is on the greenhouse floor. Hairs, fibres, fingerprints and footprints are found in the greenhouse.

Sam has suspicions about three possible suspects.

The police collect evidence from the three suspects and Sam.

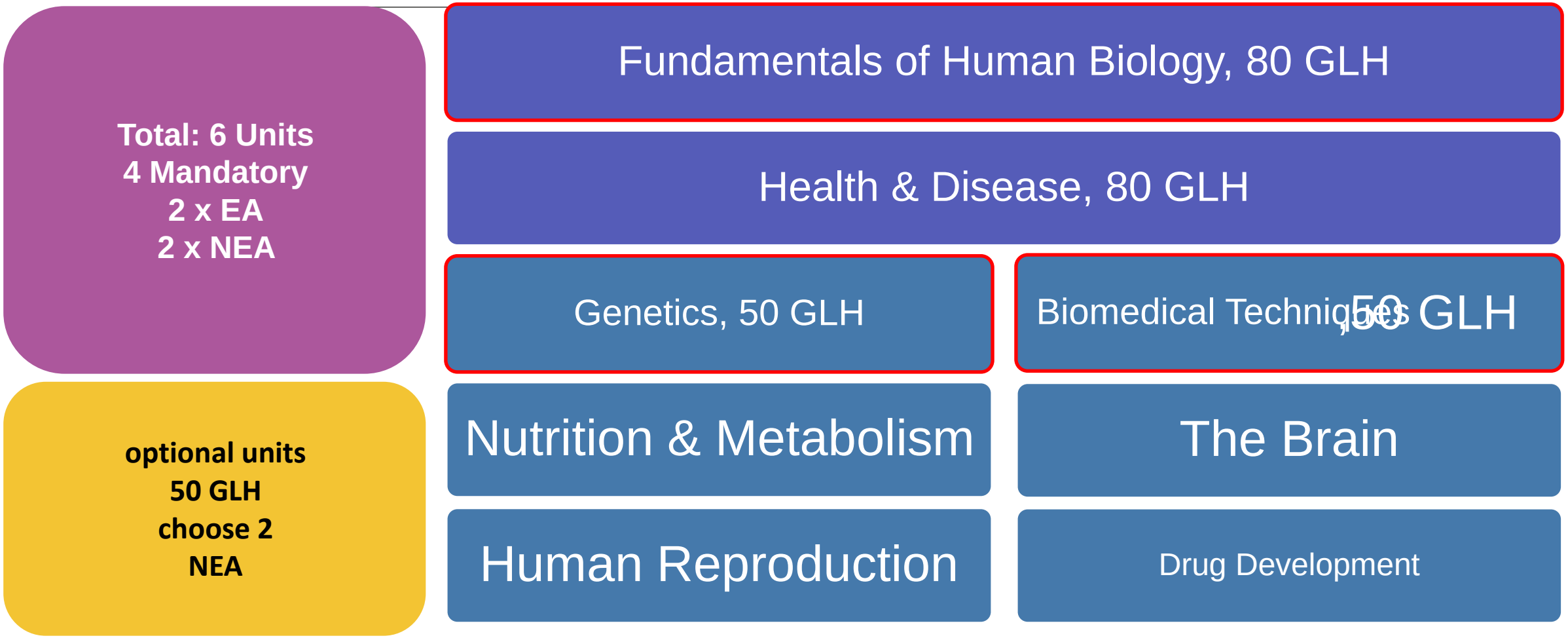
Suspect A also grows prize tomatoes. Suspect A has their right hand bandaged. Suspect A's greenhouse is full of tomato plants.

- The police obtain the following evidence from Suspect A: hairs, fibres, fingerprints, teeth marks, a cultured soil sample from a shoe, a shoe print, and tomatoes from suspect A's greenhouse.

HUMAN BIOLOGY

Human Biology, 360 GLH

Structure and Units for Extended Certificate, 360GLH



*2 mandatory units for Certificate, 180 GLH

F170 Fundamentals of Science – 1 hour 15 minutes, 60 marks

Parity with A level sciences, foundation knowledge for the NEA units
Content will be sampled from all topic areas, with at least one question or part question relating to each topic area.
Content in this exam will have links to the 'How Science Works Concepts and Skills' and 'Mathematical skills for Human Biology'.
Mixture of mcqs, short answer, calculations and extended response (up to 4 marks) and assess only:

- PO1 – Show knowledge and understanding
- PO2 – Apply knowledge and understanding

Human cells and tissues	Human physiology, organs and systems	Key concepts in endocrinology, neurobiology and reproduction	Basics of microbiology
• Cell structure and microscopy • Tissue structure and function	• Human physiology • Systems in the human body	• Key concepts of endocrinology • Key concepts of neurobiology • Key concepts of reproduction	• Key features of microbes • Beneficial microbes

F171 Health and disease – 1 hour 15 minutes, 60 marks

Content will be sampled from all topic areas, with at least one question or part question relating to each topic area. Content in this exam will have links to the 'How Science Works Concepts and Skills' and 'Mathematical skills for Human Biology'.

Mixture of mcqs, short answer, calculations and extended response (one 6 mark and one 9 mark question):

- PO1 – Show knowledge and understanding
- PO2 – Apply knowledge and understanding
- PO3 – Analyse and evaluate knowledge, understanding and performance

Causes and effects of diseases and disorders	Curative management and preventative therapies	The role of immunology	Techniques for diagnosis and monitoring	Reporting, research and confidentiality
• Definitions of health and disease • The nature of physiological disorders/diseases • The nature of communicable diseases	• Curative therapies • Management Therapies • Preventative therapies	• The immune system • Immune dysfunction and clinical immunology	• Diagnostic techniques • Monitoring techniques	• Reporting • Research • Confidentiality

Level of Response – 6 marks

13 Orla is a 65-year-old with **early stage** Parkinson's Disease. Parkinson's Disease cannot be cured and is progressive.

Orla is independent in her daily living activities. Orla has concerns about her balance and ability to participate in some activities. Orla lives alone.

Orla has a history of:

- depression
- mild bradykinesia (slowness of movement and speed)
- resting tremor
- decreased range of movement in her joints because of muscle stiffness and pain
- mild cognitive impairment.

Parkinson's Disease treatments include:

- supportive therapies
- medication
- surgery.

Analyse the therapeutic effects of the treatments on Orla's early stage Parkinson's Disease.

Level of Response – 9 marks

14 The team at a general practice surgery are trying to decide if they should change from **manual** to **electronic** health records.

The surgery has a number of issues which the team are trying to balance. The issues include:

- an increasing number of patients
- patient consultations limited to 10 minutes
- lack of space within the surgery
- a renewed focus on patient privacy
- an increased awareness of sustainability practices
- a need to communicate with a range of other medical professionals
- ongoing staff training
- a challenging financial budget.

Discuss whether the surgery should change to an **electronic** health records system.

In your answer you **must** write about:

- any **benefits** of the electronic health records system for the general practice surgery
- any **limitations** of the electronic health records system for the general practice surgery
- whether you would recommend that the general practice surgery use electronic health records **and** your reasons.

Two Mandatory NEA units

F172 Genetics and F173 Biomedical Techniques

One set assignment by OCR, 2-year lifetime, new one released each year
30-35 hours teaching, 20-23 hours assignment
Mixture of supervised and unsupervised activities

F172: Genetics

- Fundamentals of genetics
- Mode of inheritance
- Genetic counselling and genetic testing
- Gene therapy and genetic engineering

F173: Biomedical techniques

- What biomedical science is
- Diagnostic techniques: cells and microscopy
- Diagnostic techniques: biological molecules
- Planning a clinical investigation
- Report writing

Scenarios change, teaching and criteria stay the same

Unit F172: Genetics

Scenario Title: Haemophilia (Jane) and Retinitis pigmentosa (Hugo)

Scenario

You are a genetic counsellor working as part of a multidisciplinary healthcare team. You have recently had two patients referred to you by their GPs with different genetic disorders. A case study for each patient is on the following pages.

You will need to choose **one** of the case studies for the patients below:

Jane – Haemophilia

OR

Hugo – Retinitis pigmentosa

You want to provide information for the rest of your healthcare team for **one** case study. In **Tasks 1 and 2** you will create information about the genetic disorder chosen, including:

- fundamental information about the disorder
- the inheritance of the disorder
- the potential for gene therapy and genetic engineering.

In **Task 3** you will provide key information and support for the patient you have chosen.

Two optional NEA units from a choice of four

One set assignment by OCR, 2-year lifetime, new one released each year
30-35 hours teaching, 18-24 hours assignment
Mixture of supervised and unsupervised activities

F174: Nutrition and metabolism

- Nutrients required for a healthy body
- Diets and disorders
- Metabolic pathways and control mechanisms
- Diagnosis, monitoring and treatment for nutritional / metabolic disorders

F175: Human reproduction

- Conception and pregnancy
- Pregnancy (antenatal) care
- Infertility
- Assisted reproduction (AR)

F176: The brain

- Structure and function of the nervous system
- Neuron communication and control
- Nociception, neurotransmitters and drugs
- The diagnosis and treatment of brain disorders/injuries
- Monitoring and scanning the brain

F177: Drug development

- Pharmaceutical drugs
- Process of drug development
- Factors influencing drug development
- Producing a clinical research proposal

Applied, career-related scenarios

Scenario Title: Scooter accident patient (Alex)

Scenario

You are a member of a healthcare team and have been asked to construct a treatment plan for a traumatic brain injury (TBI) patient. You will need to create a presentation for other members of your healthcare team and adapt your presentation for the patient and their family.

Case study

A patient called Alex arrived at a hospital A&E department one week ago. Alex had been involved in a scooter accident and had hit their head on a wooden post.

On arrival, the A&E team followed the standard protocol for this type of accident.

- The doctor leading the team talked to Alex and Alex responded.
- Alex reported acute pain on both sides of their head and that they sensed deep pain in their right shoulder and rib cage.
- The doctor asked members of the A&E team to check Alex's pulse rate, examine their shoulder and rib cage, and to monitor their breathing rate.
- Alex was given a drug to control the pain and a blood sample was taken.
- Alex was taken to the radiography department for a CT scan and the doctor checked the scan.
- The doctor concluded that the initial source of the trauma was on one side of the brain and that the resulting area of tissue damage was located on the other side of the brain.
- Scans taken above and below the region of the brain shown in the image did not reveal further damage.

Alternative Academic Qualifications
Cambridge Advanced Nationals in Applied Science and Human Biology:
Exciting, engaging, and progressive

Questions & Thoughts

What are your two biggest take-homes?

Keeping up to date

- Sign up to our subject email updates: http://www.ocr.org.uk/i-want-to/email-updates/
- Email: science@ocr.org.uk
- Twitter: @OCR_Science
- Phone: 01223 553 998
- OCR Blog: http://www.ocr.org.uk/blog/
- Teacher Networks: https://teach.ocr.org.uk/teacher-network-events#science
- Other CPD opportunities: https://www.ocr.org.uk/qualifications/professional-development/