

# INTERNATIONAL GCSE

## Human Biology (9-1)

### GETTING STARTED GUIDE

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Pearson Edexcel International GCSE in Human Biology (4HB1)

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For first teaching September 2017

First examination June 2019



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ISBN 978 1 4469 4227 7

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<b>A</b>	<b>Getting started for teachers</b>	<b>2</b>
	<u>Introduction</u>	2
	<u>Key features of the qualification</u>	3
	<u>Qualification overview</u>	4
	<u>What's changed?</u>	6
	<u>Teaching and assessment guidance</u>	20
	<u>Course planner</u>	23
	<u>Resources</u>	27
<b>B</b>	<b>Getting started for students</b>	<b>28</b>
	<u>Student guide</u>	28

## Introduction

This Getting Started Guide provides an overview of the new Pearson Edexcel International GCSE in Human Biology, to help you identify the changes to content and assessment, and to help you understand what these mean for you and your students.

### **Support for delivering the new specification.**

Our package of support to help you plan and implement the new specification includes:

**Planning** – In addition to the relevant section in this guide, we will provide a course planner and an editable scheme of work that you can adapt to suit your department.

**Teaching and learning** – To support you in delivering the new specification, we will provide suggested resource lists and suggested activities.

**Understanding the standard** – Sample assessment materials will be provided.

**Tracking learner progress** – ResultsPlus provides the most detailed analysis available of your students' exam performance. It can help you identify topics and skills where students could benefit from further learning. We will also offer examWizard, which is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiner reports for a range of GCSE and GCE subjects.

**Support** – Our subject advisor service, and online community, will ensure you receive help and guidance from us as well as enabling you to share ideas and information with each other. You can sign up to receive e-newsletters to keep up to date with qualification updates, and product and service news. Email our subject advisor: [TeachingScience@pearson.com](mailto:TeachingScience@pearson.com)

## Key features of the qualification

- The content is quite different from the previous 4HB0 specification. It has been updated to ensure progression to IAL and GCE A Level, as well as remain comparable to Ofqual regulated GCSEs.
- The assessment model has two papers. Both papers are 1 hour and 45 minutes long and account for 90 marks. Any part of the content can be assessed in either paper. Both papers will have a range of question styles in them; calculators can be used in both papers.
- Practical skills will be assessed through the written papers; there is no coursework or practical exam.
- Students will develop analytical and logic skills by applying understanding of scientific concepts and principles to a range of situations. Some examination questions will be more problem solving in style.
- We have designed our International GCSE qualification to be of equivalent standard to Pearson regulated GCSE qualifications. This ensures that International GCSEs are recognised globally and provide students with the same progression routes.

## Qualification overview

This section provides an overview of the course to help you see what you will need to teach. The overview gives a general summary of each of the examined papers.

Human Biology Paper 1	*Paper code 4HB1/01
<ul style="list-style-type: none"><li>■ Externally assessed</li><li>■ Availability: January and June</li><li>■ First assessment: June 2019</li></ul>	50% of the total International GCSE
<b>Content summary</b> <ol style="list-style-type: none"><li>1 Cells and tissues</li><li>2 Biological molecules</li><li>3 Movement of substances in and out of cells</li><li>4 Bones, muscles and joints</li><li>5 Coordination</li><li>6 Nutrition and energy</li><li>7 Respiration</li><li>8 Gas exchange</li><li>9 Internal transport</li><li>10 Homeostatic mechanisms</li><li>11 Reproduction and heredity</li><li>12 Disease</li></ol>	
<b>Assessment</b> <ul style="list-style-type: none"><li>■ The paper is assessed through a 1-hour 45-minute written examination set and marked by Pearson.</li><li>■ The total number of marks is 90.</li><li>■ A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations and extended open-response questions.</li><li>■ A calculator may be used in the examination.</li></ul>	

<b>Human Biology Paper 2</b>	*Paper code 4HB1/02
<ul style="list-style-type: none"> <li>■ Externally assessed</li> <li>■ Availability: January and June</li> <li>■ First assessment: June 2019</li> </ul>	50% of the total International GCSE
<b>Content summary</b> <ol style="list-style-type: none"> <li>1 Cells and tissues</li> <li>2 Biological molecules</li> <li>3 Movement of substances in and out of cells</li> <li>4 Bones, muscles and joints</li> <li>5 Coordination</li> <li>6 Nutrition and energy</li> <li>7 Respiration</li> <li>8 Gas exchange</li> <li>9 Internal transport</li> <li>10 Homeostatic mechanisms</li> <li>11 Reproduction and heredity</li> <li>12 Disease</li> </ol>	
<b>Assessment</b> <ul style="list-style-type: none"> <li>■ The paper is assessed through a 1-hour 45-minute written examination set and marked by Pearson.</li> <li>■ The total number of marks is 90.</li> <li>■ A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations, comprehension and extended open-response questions.</li> <li>■ A calculator may be used in the examination.</li> </ul>	

## Assessment Objectives

		% in International GCSE
<b>AO1</b>	Knowledge and understanding of human biology	38–42%
<b>AO2</b>	Application of knowledge and understanding, analysis and evaluation of human biology	38–42%
<b>AO3</b>	Experimental skills, analysis and evaluation of data and methods in human biology	19–21%
		100%

## What's changed?

### *What's changed from the 2009 specification (4HB0)?*

One major change is that the grading will now run from grade 1 up to grade 9 to ensure comparability with the regulated GCSE. Grade 4 is roughly equivalent to the old grade C, whereas grade 9 represents a higher level of achievement than the old A\* grade, and will only be achieved by the very highest performing candidates.

The Pearson Edexcel International GCSE in Human Biology has been changed to make it considerably different from the Pearson Edexcel International GCSE in Biology; there is now less common material. We've updated the qualification areas of study to reflect current subject approaches and thinking; much of this relates to extra focus on:

- DNA
- RNA
- protein synthesis
- genetic engineering
- stem cells
- topical diseases such as Ebola, HIV and AIDS
- legal and illegal drugs.

What has changed	Current Pearson Edexcel International GCSE in Human Biology (2009) specification	New Pearson Edexcel International GCSE in Human Biology (2017) specification
<b>Mark allocation for papers</b>	<ul style="list-style-type: none"> <li>■ Paper 1: 120 marks</li> <li>■ Paper 2: 60 marks</li> </ul>	<ul style="list-style-type: none"> <li>■ Paper 1: 90 marks</li> <li>■ Paper 2: 90 marks</li> </ul>
<b>Duration of papers</b>	<ul style="list-style-type: none"> <li>■ Paper 1: 2 hours</li> <li>■ Paper 2: 1 hour</li> </ul>	<ul style="list-style-type: none"> <li>■ Paper 1: 1 hour 45 mins</li> <li>■ Paper 2: 1 hour 45 mins</li> </ul>
<b>Balance of Assessment Objectives</b>	<ul style="list-style-type: none"> <li>■ AO1: 45–55%</li> <li>■ AO2: 25–35%</li> <li>■ AO3: 20%</li> </ul>	<ul style="list-style-type: none"> <li>■ AO1: 38–42 %</li> <li>■ AO2: 38–42 %</li> <li>■ AO3: 19–21%</li> </ul>

- We've made some adjustments to the time and marks for the exam papers; both are now an equal 1 hour 45 minutes and 90 marks.
- As with the current specification, all topics will be tested on both Paper 1 and Paper 2 of the new specification.

In order to maintain consistency with the new GCSEs, we have also slightly adjusted the weightings of the Assessment Objectives; this means there is now a greater focus on the Application, Analysis and Evaluation skills.



- In the current specification, Paper 2 focused on the investigation and analysis of data. In the new specification, both Paper 1 and Paper 2 will include a mix of different question styles including calculations, multiple-choice, short-answer and extended open-response questions. In addition, Paper 2 will also include more extended questions.
- The proportion of questions targeting Assessment Objective 1 (AO1) is lower in the new specification than the current specification.
- The proportion of questions targeting Assessment Objective 2 (AO2) is higher in the new specification than the current specification.
- The proportion of questions targeting Assessment Objective 3 (AO3) is similar to the current specification.

This produces a new list of topics as follows:

### ***Removed from the current (2009) specification***

Sections and content removed from the 2009 specification are listed below:

- 11aa Recall that a mutation is rare, random change in genetic material that can be inherited.
- 11bb Recall that many mutations are harmful but some are neutral and a few are beneficial.
- 11aa Understand that mutant organisms can increase in a population by natural selection.
- 11dd Recall that the incidence of mutations can be increased by exposure to ionizing radiation etc.
- 9b sickle cell anaemia is no longer specifically mentioned in the specification.
- 11bi now includes Ebola. Polio and influenza have been removed.
- 12biii tuberculosis removed.
- 12bvi thrush removed.
- 12ci Schistosoma nutrition, life cycle, prevention of spread removed.
- The whole of Section 14 (Environment) has been removed.

## Detailed review of specification changes

Other detailed changes in content are below. New material and newly worded sections are highlighted in red.

### 1) Cells and tissues

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
1.1 recognise cell structures as seen with a light microscope and electron microscope (TEM images only), including nucleus, chromosomes, cell membrane, mitochondria, endoplasmic reticulum and ribosomes	1a
1.2 describe the functions of the cell structures: <ul style="list-style-type: none"> <li>nucleus</li> <li>chromosomes</li> <li>cell membrane</li> <li>mitochondria</li> <li>endoplasmic reticulum</li> <li>ribosomes.</li> </ul>	1a
1.3 describe the structure of a DNA molecule as: <ul style="list-style-type: none"> <li>two strands coiled to form a double helix</li> <li>containing nucleotides</li> <li>strands linked by complementary bases</li> <li>complementary bases linked by hydrogen bonds.</li> </ul>	1b
1.4 describe DNA replication as the separation of DNA strands and the formation of a new strand by complementary base pairing of nucleotides, including the role of DNA polymerase	This is new
1.5 understand that a gene is a length of DNA containing a sequence of bases that code for a specific protein. Teaching should be limited to: <ul style="list-style-type: none"> <li>the order of bases in DNA codes for the order of amino acids in a protein</li> <li>3 bases coding for one amino acid.</li> </ul>	This is new
1.6 know that RNA is a second type of nucleic acid that has the following features: <ul style="list-style-type: none"> <li>single stranded</li> <li>contains ribose</li> <li>contains uracil and that it is used to take information from DNA in the nucleus to the ribosomes for the synthesis of proteins.</li> </ul>	This is new
1.7 understand that a DNA mutation involves a change in the sequence of bases that could lead to a change in the amino acid sequence and phenotype of an individual.	This is new

1.8 describe protein synthesis as: <ul style="list-style-type: none"> <li>■ transcription – the formation of mRNA in the nucleus</li> <li>■ the transfer of mRNA to ribosomes in the cytoplasm</li> <li>■ translation of the genetic code by tRNA from mRNA codons</li> <li>■ the formation of a polypeptide chain using amino acids.</li> </ul>	This is new
1.9 outline principles of genetic engineering, including: <ul style="list-style-type: none"> <li>■ the production of genetically modified bacteria to produce human insulin</li> <li>■ the production of genetically modified plants to produce vaccines (e.g. hepatitis B) and to improve health (e.g. Golden Rice to increase vitamin A in the diet).</li> </ul>	This is new
1.10 understand that mitosis occurs during growth, repair, cloning and asexual reproduction.	1c
1.11 know the four main stages of mitosis; <b>prophase, metaphase, anaphase and telophase</b> , which results in the production of two genetically identical diploid daughter cells.	1c stage names now required
1.12 know that there are different types of stem cells, including embryonic and adult stem cells that have the ability to develop into other body cells.	This is new
1.13 describe the advantages, disadvantages and ethics in the research and use of embryonic and adult stem cells.	This is new
1.14 understand that cells are grouped into <b>tissues</b> and that <b>tissues are organised into organs</b> .	1e – same topic but slightly reworded
1.15 <b>describe</b> the structure of bone, muscle (voluntary, involuntary and cardiac, <b>as observed under a light microscope</b> ), blood, nervous tissue and epithelium (squamous and ciliated, with reference to cells lining the cheek and trachea).	1d – same topic but slightly reworded
1.16 describe the structure of cells specialised for reproduction, e.g. egg (ovum) and sperm, and relate their structure to function.	This is new

## 2) Biological molecules

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
2.1 <b>know</b> the chemical elements present in carbohydrates, proteins and lipids (fats and oils).	2a know instead of recall
2.2 understand the structure of carbohydrates, proteins and lipids as large molecules made up from smaller basic units: <ul style="list-style-type: none"> <li>■ starch and glycogen from simple sugars</li> <li>■ protein from amino acids</li> <li>■ lipids from fatty acids and glycerol.</li> </ul>	2b
2.3 describe the tests for glucose ( <b>a reducing sugar</b> ), starch, lipid and protein.	2c – term reducing sugar now required
<b>2.4 practical: investigate the qualitative and quantitative content of vitamin C in food.</b>	Embedded practical
<b>2.5 practical: investigate the energy content of food.</b>	6l – now an embedded practical
2.6 explain the role of enzymes as biological catalysts in metabolic reactions.	2d
2.7 explain the action of enzymes and how their activity is affected by: <ul style="list-style-type: none"> <li>■ temperature</li> <li>■ pH</li> <li>■ <b>substrate concentration</b></li> <li>■ <b>competitive and non-competitive inhibitors.</b></li> </ul>	2e – substrate concentration and inhibitors have been added
2.8 practical: investigate the effect of temperature and <b>pH</b> on enzyme activity.	2f – embedded practicals, but now also includes effect of pH
<b>2.9 describe the advantages of using immobilised enzymes in:</b> <ul style="list-style-type: none"> <li>■ the production of lactose-free milk</li> <li>■ the conversion of sucrose into glucose and fructose</li> <li>■ glucose testing strips for diabetics.</li> </ul>	This is new
<b>2.10 practical: investigate the action of immobilised enzymes including the preparation of alginate beads.</b>	This is new

### 3) Movement of substances into and out of cells

New Human Biology (2017) specification	Current Human Biology (2009) specification/note on change
3.1 <b>know</b> simple definitions of diffusion, osmosis and active transport.	3a know rather than recall
3.2 understand that movement of substances into and out of cells can be by diffusion, osmosis ( <b>understanding of water potential is required</b> ) and active transport.	3b – water potential is now required
3.3 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.	3c

### 4) Bones, muscles and joints

New Human Biology (2017) specification	Current Human Biology (2009) specification/note on change
4.1 <b>describe the structure and function</b> of the main parts of the skeleton: <ul style="list-style-type: none"> <li>■ axial skeleton (vertebral column, ribcage and skull)</li> <li>■ appendicular skeleton (scapula, clavicle, pelvis and limbs)</li> <li>■ the structure of a long bone <b>to include the distribution of spongy bone, compact bone and epiphysis.</b></li> </ul>	4a & 4b – slight rewording + more detail given on structure of long bones
4.2 explain the functions of joints using the elbow, shoulder and a cartilaginous intervertebral joint as examples.	4c
4.3 describe the structure of a synovial joint.	4d
4.4 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.	4e
4.5 <b>understand</b> the dietary factors controlling the healthy development of muscle and bone.	4f understand rather than recall
<b>4.6 understand the causes and symptoms of osteoporosis.</b>	This is new

## 5) Coordination

New Human Biology (2017) specification	Current Human Biology (2009) specification/note on change
5.1 <b>know</b> the structure of neurones: sensory, motor and relay.	5a know rather than recall
5.2 <b>know</b> the basic plan of the central nervous system.	5b know rather than recall
5.3 <b>know</b> the main areas of the brain and their functions including the cerebral hemispheres, cerebellum, mid brain, pituitary gland and hypothalamus.	5g know rather than recall
5.4 <b>know</b> the structure and functions of the spinal cord and the structure of a reflex arc.	5d & 5e know rather than recall/describe 5f – removed – recall spinal reflexes, including the knee jerk reflex and withdrawal reflex
5.5 <b>understand that the body contains receptors that can detect the stimuli for light, temperature, pressure/pain and taste.</b>	5h – major rewording + includes pressure/pain receptors and taste receptors
5.6 <b>describe the pathway taken by a nerve impulse to cause a response to a stimulus.</b>	5c – additional statement to old 5c
5.7 <b>practical: investigate the number and position of sensory receptors, such as touch and temperature receptors in the skin.</b>	Embedded practical
5.8 <b>understand how nerve impulses are initiated</b> , the direction of movement of an impulse along a neurone and <b>transmission</b> across a synapse.	5c – reworded (old wording was 'understand the initiation of the nerve impulse receptors, direction of movement along a neuron, transfer across a synapse')
5.9 <b>understand the action of hormones from the pituitary (ADH and gonadotrophic hormones), adrenal (adrenaline) and thyroid glands, the islets of Langerhans in the pancreas (insulin and glucagon) and the gonads, and know the role of hormones in growth and development.</b>	5i know rather than recall 5k has been removed – understand the concept of negative feedback as an essential characteristic of living systems with particular reference to temperature control and endocrine secretion
5.10 <b>understand a simple comparison between the nervous and hormonal systems.</b>	5j – reworded
5.11 <b>explain</b> the structure and function of the eye in: <ul style="list-style-type: none"> <li>■ focusing on near and distant objects</li> <li>■ responding to changes in light intensity</li> <li>■ stereoscopic vision <b>allowing better judgement of distance.</b></li> </ul>	5l – reworded – explain rather than recall
5.12 <b>understand eye defects and their treatment, i.e. long sight, short sight, astigmatism, and cataracts, and the use of corneal transplants.</b>	This is new
5.13 <b>explain</b> the structure and function of the ear in balance and hearing.	5m explain rather than recall
5.14 <b>understand how prolonged exposure to high noise levels affects the functioning of the ear and hearing.</b>	This is new
5.15 <b>practical: investigate the range of frequency audible to the human ear.</b>	Embedded practical
5.16 <b>understand the meaning of the term 'drug' and distinguish between legal and illegal drugs, including:</b> <ul style="list-style-type: none"> <li>■ the dangers of heroin, cannabis and cocaine</li> <li>■ the action of common painkillers such as paracetamol on the nervous system.</li> </ul>	This is new
5.17 <b>describe the damaging effects of alcohol on the nervous system and liver and the behavioural consequences of excessive and long-term drinking.</b>	This is new
5.18 <b>describe the causes, symptoms and treatments of mental illness, including schizophrenia and depression.</b>	This is new
5.19 <b>describe the causes, symptoms and treatments of Alzheimer's disease, vascular dementia and Parkinson's.</b>	This is new

## 6) Nutrition and energy

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
6.1 <b>explain the importance</b> of a balanced diet including the <b>recommended dietary intake</b> of carbohydrates, fats, proteins, vitamins A and C, calcium, iron and fibre.	6c explain rather than describe 6c is now also split into 6.1 and 6.3
6.2 understand variations in diet related to age, pregnancy, climate and occupation.	6b
6.3 <b>know</b> the sources and functions of carbohydrates, proteins, lipids (fats and oils), vitamins A, C and D, and the mineral ions, calcium and iron.	6c is now split into 6.1 and 6.3 Know rather than describe/recall
6.4 describe the causes and symptoms of deficiency diseases limited to scurvy (lack of vitamin C), anaemia (lack of iron), blindness (lack of vitamin A) and Kwashiorkor (lack of protein).	6e Explain the dangers to health of protein deficiency and malnutrition – reworded with more detailed content
6.5 <b>know</b> the structures of the human alimentary canal and <b>describe</b> the functions of the mouth, oesophagus, stomach, small intestine, large intestine and pancreas in digestion.	6f know rather than recognise, describe rather than outline the functions
6.6 explain how food is moved through the gut by peristalsis including the role of dietary fibre in the process.	6g
6.7 understand the role of digestive enzymes including: <ul style="list-style-type: none"> <li>■ <b>their site of production and action</b></li> <li>■ the digestion of starch to glucose by amylase and maltase</li> <li>■ the digestion of proteins to amino acids by proteases (pepsin, trypsin)</li> <li>■ the digestion of lipids to fatty acids and glycerol by lipases.</li> </ul>	6h – minor clarification of content
6.8 <b>know</b> 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.	6i know rather than recall
6.9 understand how the structure of the villus helps absorption of the products of digestion in the small intestine.	6j
6.10 know the types, structure and functions of teeth, the factors that affect their growth and how to care for teeth and gums.	6k know rather than recall
6.11 <b>understand BMI, including the calculation of BMI, and the role of obesity as a risk factor in early onset of diabetes and the significance of high cholesterol levels in atherosclerosis.</b>	This is new
6.12 <b>explain the importance of hygienic methods of food preparation, cooking, storage and preservation.</b>	Partially covered in 14g

## 7) Respiration

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
7.1 <b>know</b> that the process of respiration releases energy in living organisms.	7a know rather than recall
7.2 <b>practical: investigate the difference between inspired and expired air for carbon dioxide concentration.</b>	Embedded practical
7.3 <b>know</b> the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms.	7c know rather than recall
7.4 know the word equation for anaerobic respiration.	7f explain the formation of lactic acid in anaerobic respiration
7.5 explain the differences between aerobic and anaerobic respiration.	7b
7.6 <b>understand</b> the role of ATP in energy transfer (addition and removal of a phosphate group and associated energy requirement and release).	7e understand rather than describe & more detail given



## 8) Gas exchange

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
8.1 <b>know</b> the structure of the thorax including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes.	8a know rather than recall
8.2 explain the role of the intercostal muscles and the diaphragm in ventilation.	8b
8.3 explain how the lungs are adapted for gas exchange by diffusion.	8c now a more concise sentence (was – explain how alveoli are adapted for gas exchange by diffusion between the air in the lungs and blood in capillaries)
8.4 <b>understand</b> the terms lung capacity, vital capacity, tidal volume and <b>interpret</b> spirometer traces showing breathing movement.	8d understand rather than explain, interpret rather than explain
8.5 <b>practical: investigate the effect of exercise on the rate of breathing and measure lung capacity.</b>	8g – is now an embedded practical. The 2009 specification said ‘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’
8.6 <b>describe the regulation of carbon dioxide content in the blood including the role of chemoreceptors in the aorta and carotid arteries.</b>	8e – reworded. The 2009 specification stated ‘explain the regulation of carbon dioxide and oxygen content in the blood’.
8.7 <b>understand the term aerobic exercise.</b>	This is new
8.8 <b>understand the long-term benefits of exercise on the cardiovascular system.</b>	This is new
8.9 <b>understand the pulse rate as a measure of heart rate and explain why resting pulse can be used as a measure of physical fitness.</b>	This is new
8.10 explain why the heart rate changes during exercise and the influence of adrenaline.	9k
8.11 <b>practical: investigate the effect of exercise on the pulse rate.</b>	8g – is now an embedded practical. The 2009 specification said ‘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’.
8.12 <b>understand how an oxygen debt arises and how it is repaid after exercise.</b>	This is new
8.13 understand the damage to the respiratory and cardiovascular system caused by smoking.	8f – reworded

## 9) Internal transport

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
9.1 <b>know</b> the composition of the blood: red blood cells (erythrocytes), white blood cells (phagocytes and lymphocytes), platelets and plasma.	9a know rather than recall
9.2 understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy.	9c
9.3 know the role of tissue fluid and explain how this arises <b>as a result of pressure differences and its subsequent drainage into the lymphatic system.</b>	9m – clarification of details
9.4 explain how red blood cells are adapted for oxygen transport.	9d
9.5 understand the role of ABO blood groups and their importance in blood transfusions	9g
9.6 understand the role of white blood cells <b>including phagocytosis and antibody production (details of plasma cells are not required).</b>	9e – clarification of details
9.7 <b>describe the importance of blood clotting and the role of enzymes in causing the conversion of fibrinogen into fibrin (the names of other intermediates and enzyme names are not required).</b>	9f – reworded to give more detailed guidance
9.8 <b>compare</b> the structures of arteries, veins and capillaries, and understand their roles including the pulse.	9l compare rather than recall
9.9 <b>know</b> the general plan of the circulatory system to include the blood vessels to and from the heart, the lungs, the liver and the kidneys.	9n know rather than recall
9.10 <b>know</b> the structure of the heart and how it functions.	9i know rather than recall
9.11 <b>describe the causes, prevention and treatment of heart disease including:</b> ■ the effect of diet and exercise ■ the use of stents, artificial hearts and transplants.	9j – reworded to give more detailed guidance
9.12 <b>understand the problems associated with heart transplants.</b>	9h
9.13 <b>describe the use of statins and plant stanol esters in the treatment and prevention of circulatory disorders.</b>	This is new
9.14 <b>understand the role of beta-blockers in the treatment of circulatory disorders, e.g. heart failure and angina.</b>	This is new
9.15 <b>explain the terms systolic and diastolic blood pressure.</b>	This is new
9.16 <b>describe the causes, prevention and treatment of hypertension.</b>	This is new
9.17 <b>understand the role of ACE inhibitors in the treatment of high blood pressure.</b>	This is new
9.18 <b>describe how monoclonal antibodies are produced.</b>	This is new
9.19 <b>understand how monoclonal antibodies work to detect and treat diseases such as cancer.</b>	This is new

**10) Homeostatic mechanisms.**

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
10.1 <b>know</b> the structure and functions of the skin and explain the role of sweat glands, vasoconstriction, vasodilation and shivering in temperature regulation.	10c know rather than recall
10.2 <b>know</b> the definition of excretion; the removal of metabolic waste, including urea, carbon dioxide and water.	10d know rather than recall
10.3 know the structure and functions of the renal system.	10e know rather than recall
10.4 explain why the composition of urine may vary.	10e – now split into 10.3 and 10.4
10.5 <b>describe the role of the hypothalamus and pituitary gland in osmoregulation.</b>	New sentence, though would have been taught as part of osmoregulation in the 2009 specification
10.6 <b>explain</b> the role of ADH in regulating the water content of the blood.	10m explain rather than describe
10.7 <b>understand the roles of insulin and glucagon in maintaining blood glucose levels.</b>	This is a new sentence but would have been covered by 5i and 10r in the 2009 specification
10.8 <b>understand the concept of homeostasis and the role of negative feedback, with particular reference to temperature control and blood glucose concentration.</b>	Clearer wording in the new specification – though this would have been covered in the 2009 specification in 10b and 5k
10.9 describe the advantages and disadvantages of: ■ kidney transplants ■ kidney dialysis.	10o simplified wording
10.10 <b>practical: investigate diffusion using a partially-permeable membrane such as Visking tubing.</b>	Embedded practical
10.11 describe the functions of the liver in bile production, regulation of blood sugar, urea formation and detoxification including the breakdown of alcohol.	10r

## 11) Reproduction and heredity

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
11.1 <b>know</b> that the process of fertilisation involves the fusion of a male and female gamete to produce a zygote.	11a know rather than recall
11.2 describe how a zygote divides to form an embryo.	11a and 11e are now more clearly written as 11.1 and 11.2
11.3 know the stages of meiosis allowing the production of haploid gametes and <b>its significance in bringing about variation in a species.</b>	11b – reworded and now includes the significance of variation
11.4 <b>know</b> the structure and function of the male and female reproductive systems.	11c know rather than recall
11.5 understand the roles of oestrogen, progesterone, FSH and LH in the menstrual cycle.	11d– now split into 11.5 and 11.6
11.6 explain the role in pregnancy of the: <ul style="list-style-type: none"> <li>■ hormone progesterone</li> <li>■ placenta</li> <li>■ amniotic fluid</li> <li>■ <b>umbilical cord.</b></li> </ul>	11d, 11f, 11g– reworded and consolidated into 11.6
11.7 <b>know</b> the roles of oestrogen and testosterone in the development of secondary sexual characteristics.	11h know rather than recall
11.8 describe the birth process and explain the advantages of breast feeding.	11i
11.9 describe an outline of growth and development to maturity, <b>to include growth curves for humans.</b>	11j
11.10 describe the methods of contraception by hormonal, barrier and natural methods, intra-uterine devices and sterilization.	11k– now split into 11.10, 11.11 and 11.12
11.11 describe the advantages and disadvantages of each contraceptive method.	11k –now split into 11.10, 11.11 and 11.12
<b>11.12 describe the process of IVF and how it can improve the chances of pregnancy.</b>	11k –now split into 11.10, 11.11 and 11.12 with IVF and pregnancy explicitly stated
11.13 <b>know</b> that genes exist in alternative forms called alleles which give rise to differences in inherited characteristics.	11n know rather than recall
11.14 <b>know</b> the meaning of the terms dominant, recessive, homozygous, heterozygous, phenotype, genotype, co-dominance, diploid and haploid.	11o know rather than recall
11.15 <b>know</b> that the sex of a person is controlled by one pair of chromosomes, XX in a female and XY in a male.	11t know rather than recall
11.16 explain how the sex of offspring is determined at fertilisation using a genetic diagram.	11u
11.17 understand that random fertilisation produces genetic variation of offspring.	11x
11.18 understand the role of multiple alleles in the inheritance of ABO blood groups.	11p
11.19 understand patterns of monohybrid inheritance using a genetic diagram <b>and the probabilities of outcomes.</b>	11q
11.20 understand how to interpret family pedigrees	11r

11.21 describe the causes and effects of inherited conditions such as haemophilia and red-green colour blindness (sex-linked inheritance), polydactyly (dominant allele) and cystic fibrosis (recessive allele).	9b sickle cell anaemia is no longer specifically mentioned in the specification
11.22 describe how gene therapy with viruses can be used to treat cystic fibrosis.	This is new
11.23 understand that random fertilisation produces genetic variation of offspring.	11x
11.24 understand that variation within a species can be genetic, environmental or a combination of both.	11z

## 12) Disease

New Human Biology (2017) specification	Current Human Biology (2009) specification/ note on change
12.1 understand the general course of a disease as: infection, incubation and symptoms.	11a
12.2 know that diseases are caused by pathogenic microorganisms.	11b
12.3 describe the structure and reproduction of viruses.	11bi
12.4 describe methods of transmission, treatment and prevention of the spread of Ebola and HIV (human immuno-deficiency virus), the virus that causes AIDS.	11bi – now includes Ebola. Polio and influenza have been removed
12.5 describe the structure, nutrition and reproduction of bacteria including the interpretation of bacterial growth curves.	11bii – now includes bacterial growth curves
12.6 investigate the effects of antibacterial agents and antibiotics on the growth of bacterial culture.	Embedded practical
12.7 know the methods of transmission, treatment and prevention of the spread of cholera and gonorrhea.	12biii – tuberculosis removed. Cholera added Typhoid still appears in 12.10
12.8 explain the importance of oral rehydration therapy.	ORT now explicitly mentioned
12.9 know the methods of transmission, treatment and prevention of the spread of athlete's foot.	12bvi – thrush removed
12.10 explain the role of the mosquito (malaria) and housefly (typhoid) in transmitting causative agents of disease.	12cii – reworded in 12.10 and 12.11
12.11 describe the treatment and prevention of the spread of malaria and typhoid.	12cii – reworded in 12.10 and 12.11
12.12 understand the antibody-antigen reaction.	12eiii
12.13 explain how vaccines work to prevent the spread of disease.	12eii – reworded
12.14 understand the differences between natural and artificial immunity and active and passive immunity.	12ei
12.15 know the sources and role of antibiotics.	12eiv
12.16 explain how resistant pathogens such as MRSA arise and why they are a cause for concern.	This is new
12.17 understand the role of non-pathogenic bacteria and fungi (decomposers) useful to humans in the decomposition of organic matter.  (details of other bacteria in the nitrogen and carbon cycles are not required)	13a
12.18 know the processes of sewage treatment in modern sewage works and a pit latrine.	13b

## Teaching and assessment guidance

The assessment for this qualification is linear and both papers must be taken in the same series.

There will be a range of compulsory question styles including multiple-choice questions, short-answer questions, calculations and extended open-response questions on both papers.

Students may be required to perform calculations, draw graphs and describe, explain and interpret physical 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 situations.

Questions targeted at the higher grades will be designed to test knowledge, understanding, application, analysis, evaluation and experimental skills. Some questions will require longer prose answers.

### Unit 1: Cells and tissues

There is a range of new material in topic 1 relating to DNA/RNA/DNA replication/protein synthesis as outlined in the table below. These are areas that students often find difficult to understand given their conceptual nature and lack of visibility.

1.3 describe the structure of a DNA molecule as: <ul style="list-style-type: none"><li>■ two strands coiled to form a double helix</li><li>■ containing nucleotides</li><li>■ strands linked by complementary bases</li><li>■ complementary bases linked by hydrogen bonds.</li></ul>
1.4 describe DNA replication as the separation of DNA strands and the formation of a new strand by complementary base pairing of nucleotides, including the role of DNA polymerase.
1.5 understand that a gene is a length of DNA containing a sequence of bases that code for a specific protein. Teaching should be limited to: <ul style="list-style-type: none"><li>■ the order of bases in DNA codes for the order of amino acids in a protein</li><li>■ 3 bases coding for one amino acid.</li></ul>
1.6 know that RNA is a second type of nucleic acid that has the following features: <ul style="list-style-type: none"><li>■ single stranded</li><li>■ contains ribose</li><li>■ contains uracil and that it is used to take information from DNA in the nucleus to the ribosomes for the synthesis of proteins.</li></ul>
1.7 understand that a DNA mutation involves a change in the sequence of bases that could lead to a change in the amino acid sequence and phenotype of an individual.
1.8 describe protein synthesis as: <ul style="list-style-type: none"><li>■ transcription – the formation of mRNA in the nucleus</li><li>■ the transfer of mRNA to ribosomes in the cytoplasm</li><li>■ translation of the genetic code by tRNA from mRNA codons</li><li>■ the formation of a polypeptide chain using amino acids.</li></ul>
1.9 outline principles of genetic engineering, including: <ul style="list-style-type: none"><li>■ the production of genetically modified bacteria to produce human insulin</li><li>■ the production of genetically modified plants to produce vaccines (e.g. hepatitis B) and to improve health (e.g. Golden Rice to increase vitamin A in the diet)</li></ul>

### Advice on teaching approaches for the new content above

Refer carefully to the specification to ensure that only the necessary level of detail is taught to students; it is easy to go into unnecessary depth beyond that required and this can be overwhelming for students. The scheme of work provides a possible framework and teaching activities to use to approach this material in weeks 2 and 3.

Much of the material lends itself to Assessment for Learning approaches; allowing students to self-review and improve their own understanding while giving teachers a good indication of student progress. Creative modeling and presentation style approaches will help make key processes and the nature of genetics more 'visible' and accessible to students and allow for a range of differentiated learning outcomes. Familiarity with key words and terms is essential and can be developed by word searches, crosswords or use of key pictures/diagrams.

'Describing' DNA/RNA/DNA replication and protein synthesis can be taught very effectively through a modeling approach. Students can use a variety of materials to create and discuss the structure of DNA and RNA, examining similarities and differences. How close can students get to representing the detail needed; for example of the nature of the nucleotides and complementary base pairing?

Protein synthesis (1.8) could be taught to students by:

- Each student/group creating a storyboard/flick book/movie of each sequential step.
- They might want to summarise this [movie](#) clip here in four different pictures – one for each step.
- Students could also act out the required detail of each of the steps in protein synthesis (1.8) and ask other students to determine which step they are presenting.

The links to the other relevant parts of the specification can be reinforced and made clearer (e.g. 1.8 describe protein synthesis and 1.6 RNA features). A starter activity for protein synthesis might have the following questions:

- Where does the RNA come from?
- What is RNA made from (nucleotides)?
- What do nucleotides look like and how are nucleotides linked together (hydrogen bonds)?

There are a range of useful online resources and advice to help you teach these areas; but be sure to check that the level is appropriate for your learners.

## A Getting started for teachers

The new [sample assessment material](#) can be very helpful in getting a feel for the style of questions that might be asked and the level of detail required by students. Paper 1, question 4, relates to stem cells. Paper 2, question 3, focuses on DNA, RNA and inheritance.

- 4 (a) Two types of nucleic acid are found in cells. These are DNA and RNA.

Describe **three** differences between DNA and RNA.

(3)

1 .....

2 .....

3 .....

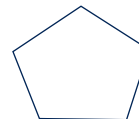
- (b) The symbols shown can be used to represent the components of nucleotides that join together to make nucleic acid.



base



phosphate



sugar

Draw a section of RNA consisting of two nucleotides using the symbols given.

(3)



## Course planner

You will find a more detailed lesson plan in the scheme of work document, which gives suggested teaching times for each unit. This is editable so that you can customise it to meet your own needs. An overview of a two- year course planner might be as follows, each week accounts for 2 Guided Learning Hours over 60 weeks of teaching to give a total of 120 hours.

### Two- year course planner

Week No.	Topic	Lesson content	Sub-topics covered
1	<b>Section 1 Cells and Tissues 12 hours</b>	1.1, 1.2	Cell structures and functions
2		1.3, 1.4	Structure of DNA and DNA replication
3		1.5, 1.6, 1.7, 1.8	Protein synthesis and mutations
4 (a)		1.9	Genetic engineering
4 (b)		Consolidation and assessment	Cell structure DNA replication and genetic engineering
5		1.10, 1.11, 1.12, 1.13	Mitosis Stem cells Ethics
6		1.14, 1.15, 1.16	Cells, tissues and organs Bone and muscle Specialised cells
7	<b>Section 2 Biological Molecules 11 hours</b>	2.1, 2.2, 2.3	Elements present Structures of molecules Tests for molecules
8		2.4, 2.5	Embedded practicals
9		2.6, 2.7	Enzymes as catalysts Factors affecting enzymes
10		2.8	Embedded practical
11		2.9, 2.10	Immobilised enzymes + embedded practical
12 (a)		Consolidation and assessment	Enzymes
12 (b)	<b>Section 3 Movement of Substances 3 hours</b>	3.1, 3.2	Definitions + osmosis
13		3.3	Factors affecting movement
14	<b>Section 4 Bones, Muscles and Joints 4 hours</b>	4.1, 4.2, 4.3	Skeleton Joints Structure of synovial joint
15		4.4, 4.5, 4.6	Muscles Dietary factors Osteoporosis

## A Getting started for teachers

Week No.	Topic	Lesson content	Sub-topics covered
16	<b>Section 5 Coordination 16 hours</b>	5.1, 5.2, 5.3	Neurone structure CNS Main areas of the brain
17		5.4, 5.5, 5.6,	Reflex arc Receptors Impulse pathway
18		5.7, 5.8	Initiation of impulses + embedded practical
19		5.9, 5.10	Nervous system vs hormones Action of various hormones
20		5.11, 5.12	Structure and function of the eye Eye defects
21		5.13, 5.14, 5.15	Structure and function of the ear Noise Embedded practical
22		5.16, 5.17	Legal and illegal drugs Alcohol
23 (a)		5.18, 5.19	Mental illness
23 (b)		Consolidation and assessment	Neurons, reflexes, impulses, hormones, eye, ear, drugs, alcohol, mental illness
24	<b>Section 6 Nutrition and Energy 10 hours</b>	6.1, 6.2, 6.3, 6.4	Balanced diet Variations & sources in diet Deficiency diseases
25		6.5, 6.6, 6.7	Alimentary canal Peristalsis Digestive enzymes
26		6.8, 6.9	Bile, Structure of villus
27		6.10	Teeth
28 (a)		6.11, 6.12	BMI Obesity Food hygiene
28 (b)		Consolidation and assessment	Diet, alimentary canal, digestion, teeth, BMI, food hygiene
29	<b>Section 7 Respiration 4 hours</b>	7.1, 7.2, 7.3	Respiration + embedded practical
30 (a)		7.4, 7.5, 7.6	Anaerobic respiration ATP
30 (b)		Consolidation and assessment	Respiration & ATP

Week No.	Topic	Lesson content	Sub-topics covered
31	<b>Section 8 Gas Exchange 12 hours</b>	8.1, 8.2, 8.3	Gas exchange system Ventilation Diffusion
32		8.4, 8.5	Vital capacity Tidal volume Spirometer + embedded practical
33		8.6, 8.7, 8.8, 8.9	Chemoreceptors Aerobic exercise Pulse rate and heart rate
34		8.10, 8.11	Heart rate and adrenaline + embedded practical
35		8.12, 8.13	Oxygen debt Smoking
36		Consolidation and assessment	Gas exchange, exercise, oxygen debt Smoking
37	<b>Section 9 Internal Transport 12 hours</b>	9.1, 9.2, 9.3	Composition of the blood Role of plasma Tissue fluid
38		9.4, 9.5, 9.6, 9.7	Red blood cells ABO blood groups White blood cells
39		9.8, 9.9	Blood vessel structure plan of circulatory system
40		9.10, 9.11, 9.12	Heart structure Heart disease Heart transplants
41		9.13, 9.14, 9.15, 9.16, 9.17	Treatment and prevention Hypertension ACE inhibitors
42 (a)		9.18, 9.19	Monoclonal antibodies
42 (b)		Consolidation and assessment	Blood, tissue fluid, heart, heart disease
43	<b>Section 10 Homeostatic Mechanisms 12 hours</b>	10.1	Skin and thermoregulation
44		10.2, 10.3, 10.4	Excretion Renal system Urine composition
45		10.5, 10.6	Osmoregulation
46		10.7, 10.8	Insulin Glucagon Homeostasis and negative feedback
47		10.9, 10.10, 10.11	Transplants Dialysis Embedded practical Liver
48		Consolidation and assessment	Homeostasis, thermoregulation, osmoregulation, negative feedback

## A Getting started for teachers

Week No.	Topic	Lesson content	Sub-topics covered
49	<b>Section 11 Reproduction and Hereditary 14 hours</b>	11.1, 11.2, 11.3, 11.23, 11.24	Fertilisation Division of zygote Meiosis Variation
50		11.4, 11.5, 11.6, 11.7	Structure of reproductive systems Menstrual cycle Pregnancy Secondary sexual characteristics
51		11.8, 11.9, 11.10, 11.11, 11.12	Birth Growth curves Contraception IVF
52		11.13, 11.14, 11.15, 11.16, 11.17	Genetic terms XX & XY Sex determination Random fertilisation
53		11.18, 11.19, 11.20	Multiple alleles Monohybrid inheritance Pedigree charts
54		11.21	Dominant Recessive and sex linked conditions
55 (a)		11.22	Gene therapy
55 (b)		Consolidation and assessment	Reproduction and inheritance
56	<b>Section 12 Disease 10 hours</b>	12.1, 12.2, 12.3, 12.4	Disease Pathogens Viruses and HIV
57		12.5, 12.6, 12.7, 12.8	Bacteria and disease Cholera Gonorrhea ORT
58		12.9, 12.10, 12.11	Fungal diseases Malaria
59		12.12, 12.13, 12.14, 12.15, 12.16	Vaccines Immunity Antibiotics Resistant pathogens
60 (a)		12.17, 12.18	Non-pathogenic bacteria Sewage
60 (b)		Consolidation and assessment	Disease, pathogens, viruses, bacteria, fungi, vaccines, immunity, sewage

## Suggested resources

We recognise that new resources will become available throughout the lifetime of a qualification. We will therefore supply a version of this resource list on our website, which will be updated on an ongoing basis.

Name of resource	Link and Information
<b>Dedicated Science Subject Advisor</b>	Email: <a href="mailto:TeachingScience@pearson.com">TeachingScience@pearson.com</a> Telephone UK: 020 7010 2190 Telephone Intl: +44 (0)20 7010 2190 Twitter: <a href="https://twitter.com/PearsonSciences">@PearsonSciences</a>
<b>examWizard</b>	examWizard is a free online resource for teachers containing a huge bank of past paper questions and support materials to help you create your own mock exam and tests. <a href="http://qualifications.pearson.com/en/support/Services/examwizard.html">http://qualifications.pearson.com/en/support/Services/examwizard.html</a>
<b>ResultsPlus</b>	ResultsPlus is a free online results tool analysis for teachers that give a detailed breakdown of your students' performance in Edexcel exams. <a href="https://qualifications.pearson.com/en/support/Services/ResultsPlus.html">https://qualifications.pearson.com/en/support/Services/ResultsPlus.html</a>
<b>Sample assessment material and specimen papers</b>	<a href="https://qualifications.pearson.com/en/qualifications/edexcel-international-gcses-and-edexcel-certificates/international-gcse-human-biology-2017.coursematerials.html#filterQuery=category:Pearson-UK:Category%2FSpecification-and-sample-assessments">https://qualifications.pearson.com/en/qualifications/edexcel-international-gcses-and-edexcel-certificates/international-gcse-human-biology-2017.coursematerials.html#filterQuery=category:Pearson-UK:Category%2FSpecification-and-sample-assessments</a>
<b>Textbooks and student materials</b>	<a href="https://qualifications.pearson.com/en/qualifications/edexcel-international-gcses-and-edexcel-certificates/international-gcse-human-biology-2017.resources.html#filterQuery=category:Pearson-UK:Publisher%2FPearson">https://qualifications.pearson.com/en/qualifications/edexcel-international-gcses-and-edexcel-certificates/international-gcse-human-biology-2017.resources.html#filterQuery=category:Pearson-UK:Publisher%2FPearson</a>

## Student guide

### Why study the Pearson Edexcel International GCSE in Human Biology?

This course will enable you to:

- learn and apply knowledge and understanding of human biology facts, terminology, concepts, principles and practical techniques
- develop analytical and practical skills by applying understanding of scientific concepts and principles to a range of familiar and unfamiliar situations.
- prepare for more advanced courses in biology and for other courses that require knowledge of human biology.

### What do I need to know, or be able to do, before taking this course?

We recommend that students are able to read and write in English at Level B2 of the Common European Framework of Reference for Languages, otherwise there are no prior learning requirements for this qualification.

### Is this the right subject for me?

Have a look at our qualification overview to get an idea of what's included in this qualification. Then, why not get in touch with our student services, [students@pearson.com](mailto:students@pearson.com), to discuss any outstanding questions you might have?

You could also have a look at <http://qualifications.pearson.com/en/campaigns/pearsonqualifications-around-the-world.html#tab-Edexcel> to find out what students and education experts around the world think about our qualifications.

If you intend to pursue a career or further study in medicine, dentistry or for another health focused role then this qualification will allow you to gain more specific knowledge and understanding of appropriate human biology. The International GCSE in Biology can be taken alongside this course. While some content overlaps, the majority of this qualification is different from biology.

We also offer a Science (Double Award) and Science (Single Award). Both contain specific biology content, equally weighted with chemistry and physics. While they have a similar standard of assessment rigour these qualifications cover a reduced volume of Biology material compared with this qualification.

### How will I be assessed?

This qualification is by 100% written examination on two papers. Understanding and application of practical knowledge and skills will be assessed in the written exam. There is no coursework.

### What can I do after I've completed the course?

You can progress from this qualification to:

- International Advanced Subsidiary, for example in Biology
- International Advanced Level, for example in Biology
- GCE Advanced Subsidiary, for example in Biology
- GCE Advanced Level, for example in Biology
- Level 3 vocational qualifications in science, for example BTEC Level 3 in Applied Science
- other comparable Level 3 qualifications, such as the International Baccalaureate Diploma Programme
- employment, for example in a science-based industry where an apprenticeship may be available
- other equivalent Level 3 Biology qualifications or further study in other areas where science or human biology is required
- further training or employment where numeracy, logic, analytical skills and science knowledge are required.

### What next?

Talk to your subject teacher at school or college for further guidance, or if you are a private candidate you should visit <http://qualifications.pearson.com/en/support/support-for-you/students.html>

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visit [qualifications.pearson.com](http://qualifications.pearson.com)

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