

Biology

for the IB Diploma

Exam Preparation Guide

First edition

Brenda Walpole

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CONTENTS

Introduction	v	6 Human physiology	77
How to use this book	vi	6.1 Digestion and absorption	77
1 Cell biology	1	6.2 The blood system	80
1.1 The cell theory and cell size	1	6.3 Defence against infectious disease	83
1.2 Ultrastructure of cells	4	6.4 Gas exchange	85
1.3 Membrane structure	7	6.5 Neurons and synapses	88
1.4 Membrane transport	8	6.6 Hormones, homeostasis and reproduction	92
1.5 Origin of cells	9	7 Nucleic acids (HL)	100
1.6 Cell division	10	7.1 DNA structure and replication	100
2 Molecular biology	13	7.2 Transcription and gene expression	103
2.1 Molecules to metabolism	13	7.3 Translation	105
2.2 Water	16	8 Metabolism, cell respiration and photosynthesis (HL)	109
2.3 Carbohydrates and lipids	18	8.1 Metabolism	109
2.4 Proteins	21	8.2 Cell respiration	111
2.5 Enzymes	24	8.3 Photosynthesis	116
2.6 Structure of DNA and RNA	28	9 Plant biology (HL)	120
2.7 DNA replication, transcription and translation	30	9.1 Transport in the xylem	120
2.8 Cell respiration	34	9.2 Transport in the phloem	123
2.9 Photosynthesis	37	9.3 Growth	125
3 Genetics	41	9.4 Reproduction	127
3.1 Genes	41	10 Genetics and evolution (HL)	130
3.2 Chromosomes	43	10.1 Meiosis	130
3.3 Meiosis	46	10.2 Inheritance	132
3.4 Inheritance	48	10.3 Gene pools and speciation	139
3.5 Genetic modification and biotechnology	54	11 Animal physiology (HL)	143
4 Ecology	58	11.1 Antibody production and vaccination	143
4.1 Species communities and ecosystems	58	11.2 Movement	146
4.2 Energy flow	60	11.3 The kidney and osmoregulation	149
4.3 Carbon recycling	62	11.4 Which processes occur in the sections of a kidney tubule?	151
4.4 Climate change	64	11.5 Sexual reproduction	155
5 Evolution and biodiversity	68		
5.1 Evidence for evolution	68		
5.2 Natural selection	70		
5.3 Classification of biodiversity	72		
5.4 Cladistics	74		

Contents

A	Neurobiology and behaviour	160	C	Ecology and conservation	192
	A1 Neural development	160		C1 Species and communities	192
	A2 The human brain	161		C2 Communities and ecosystems	195
	A3 Perception of stimuli	164		C3 Impacts of humans on ecosystems	199
	A4 Innate and learned behaviour	167		C4 Conservation of biodiversity	201
	A5 Neuropharmacology (HL)	170		C5 Population ecology (HL)	205
	A6 Ethology (HL)	173		C6 The nitrogen and phosphorus cycles (HL)	207
B	Biotechnology and bioinformatics	176	D	Human physiology	210
	B1 Microbiology: organisms in industry	176		D1 Human nutrition	210
	B2 Biotechnology in agriculture	180		D2 Digestion	212
	B3 Environmental protection	183		D3 Functions of the liver	216
	B4 Medicine (HL)	186		D4 The heart	220
	B5 Bioinformatics (HL)	189		D5 Hormones and metabolism (HL)	223
				D6 Transport of respiratory gases (HL)	226
				Glossary	231
				Answers to Test yourself questions	235
				Index	245

INTRODUCTION

This book is to help you as you prepare for your final IB exams in either Standard or Higher Level Biology. It contains all the information that is covered in your syllabus in a clear and concise way. It will help you revise the key points and also help you to prepare for writing answers in the exams. All the Options are included but you should only revise the one you have been taught and will need for your exam.

At the start of each topic you will find a list of what it contains and the key information to revise. You can use this to check off each topic as you work through it. Each revision point is presented in the form of a question in the chapters. You might like to try to answer the question before and after reading the information so you can monitor how much you have understood and remembered.

Also, look out for diagrams which you may be asked to draw or label – these are clearly marked. Finally, don't forget to check your practical notes or text book to make sure you are confident about the experiments you have carried out during your studies.

Good luck!

General tips for revision

- Make sure you take lots of breaks when revising and be aware of yourself – stop if you are not taking anything in, do something else for a little while and then come back to your revision.
- Practise questions as well as learning material. There are some types of questions that come up regularly – learn the methods for doing these.
- Try to understand the topics – the more you can understand, the less you will have to learn by rote.
- You will not be allowed a calculator for Paper 1 (the multiple choice paper), so when you do past papers do them under timed conditions without a calculator.
- Do not learn mark schemes – use them as a guide to the type of answers required. You are unlikely to get an identical question to one in a past paper.

General tips for examinations

- Get a good night's sleep so that you are fresh for the exams!
- Be aware of time. Use the number of marks for each question as a guide to plan how long you should spend on each question. Always use the time you are given to read the questions carefully before you answer. Don't rush and remember that marks are not deducted for wrong answers so it's always worth trying to answer, even if you are not absolutely sure you're correct.
- Be aware of the number of marks for each question – if there are 3 marks available for a particular question then you should make sure that you make at least three points in your answer.
- Think carefully about your answers and try to make them concise and clear as possible – you do not have to write in complete sentences.

In your exam you will have three papers summarised in the table below.

Paper	% of mark	Standard Level	Higher Level	Type of questions
1	SL and HL 20	45 mins	1 hour	Multiple choice questions: 30 for SL and 40 for HL
2	SL 40 HL 36	1 hour 15 mins	2 hours 15 mins	Section A: Short answer questions. Section B: Longer response questions. One out of two for SL and two out of three for HL
3	SL 20 HL 24	1 hour	1 hour 15 mins	Section A: Short-answer questions based on experimental work. Section B: Questions from one of the options that you have studied.

HOW TO USE THIS BOOK: A GUIDED TOUR

Introduction – sets the scene of each chapter, helps with navigation through the book and gives a reminder of what's important about each topic.



This chapter covers the following topics:

- The cell theory and cell size
- Membrane structure
- Origin of cells
- Ultrastructure of cells
- Membrane transport
- Cell division

Definitions – clear and straightforward explanations of the most important words in each topic.

DEFINITIONS

DIFFUSION is the passive movement of molecules such as oxygen, carbon dioxide or glucose down a concentration gradient.

FACILITATED DIFFUSION is a special case of diffusion across a membrane through specific protein channels.

OSMOSIS is the passive diffusion of water molecules from a region of higher concentration of water molecules to a region of lower concentration of water molecules.

ACTIVE TRANSPORT is the movement of substances against a concentration gradient. This process requires energy in the form of ATP.

Model answer – an example of an answer that would score full marks to show you exactly what an examiner wants to see.

☆ Model answer 6.1

Explain how the function of arteries, capillaries and veins is related to their structure. [8]

Arteries carry blood under high pressure, so their structure must withstand this pressure; they have thick muscular walls; elastic fibres that can recoil when blood has passed through them; and smooth lining to reduce friction.

Capillaries receive low-pressure blood; their function is to allow useful substances to pass from the blood into cells; structures that allow this are their very thin walls (one cell), so diffusion is easy, fenestrations or spaces which allow substances through, small diameter and large surface area that allow them to penetrate tissues and reach every cell.

Veins receive blood under low pressure from the capillaries; their role is to return it to the heart; walls are thin as there is no pressure to withstand; they contain valves so that blood does not flow backwards.

How to use this book: a guided tour

Annotated exemplar answer – a question with a sample answer plus examiners' comments about what was good and what could be improved. An excellent way to see how to snap up extra marks.

Annotated exemplar answer 2.1

Outline the effect of increasing the temperature of human amylase from 0°C to 60°C on the rate of digestion of starch. [3]

The optimum temperature for the action of amylase is about 35°C.

Below this temperature the rate of digestion of starch will be lower.

Above 35°C the rate of digestion will decrease and at about 45°C the enzyme will be denatured so that the reaction cannot proceed.

(2/3)

A good place to start, but mention that this is about the temperature in the mouth.

To gain the mark mention specific temperatures. At temperatures between 0°C and 10°C the reaction rate will be almost zero but will slowly increase to its maximum between 20°C and 35°C.

Notice that the question only asks for an 'outline' of the effect of temperature on digestion. Do not be tempted to write too much, the space provided will give you a hint about how much is needed. You could include a simple graph to supplement your answer.

Worked example 1.1

Stage	Number of cells
interphase	530
prophase	19
metaphase	24
anaphase	8
telophase	18

To calculate the number of cells in mitosis:
 $19 + 24 + 8 + 18 = 69$
 Total number of cells in the sample:
 $69 + 530 = 599$
 Mitotic index for this sample:
 $\frac{69}{599} = 0.12$

Worked examples – a step by step approach to answering exam-style questions, guiding you through from start to finish.

hint

Try to invent an acronym to help you remember the stage of mitosis, for example 'Parrots Make Awful Teachers'.

Hints – quick suggestions to remind you about key facts and highlight important points.

Test yourself questions – check your own knowledge and see how well you're getting on by answering questions.

TEST YOURSELF 1.1

What are the three key parts of the cell theory?

Nature of Science – these discuss particular concepts or discoveries from the points of view of one or more aspects of Nature of Science.



Nature of Science. Chemiosmosis theory was proposed by Peter Mitchell in 1961, but it took many years to be accepted because it was a radical departure from the accepted theory of the time. The chemiosmotic theory produced a paradigm shift in biochemistry.

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