

# **2000 HSC Notes from the Examination Centre Biology**

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Tel: (02) 9367 8111  
Fax: (02) 9262 6270  
Internet: <http://www.boardofstudies.nsw.edu.au>

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# Biology

## Introduction

In the final year for this syllabus, 14753 candidates sat for the 2000 Higher School Certificate Biology examination. The standard of candidates' responses was consistent with trends observed in previous years with the better prepared candidates demonstrating good biology in their responses. However, there is still a number of candidates who showed a lack of understanding of biological terminology and a confusion in the use of the language of Biology. An example of this is the difficulty candidates demonstrated with the term "immunisation", which a significant number of candidates either could not define or used inappropriately. Candidates must show competence in the use of language especially when it is used in the syllabus.

To be successful in Biology, a candidate must understand the content of the course and be able to communicate that information clearly and concisely using appropriate and recognisable terms. There was some evidence that many candidates misinterpreted the intent of some questions. Many candidates were able to list or identify while few were able to evaluate or justify answers.

Comments about individual questions follow.

## Section I – The Core

### PART A

Candidates were generally able to score well across the multiple-choice questions. The table gives the correct responses and the percentages of candidates selecting each alternative for that question.

Question	Answer	% Correct
1	B	71.86
2	D	74.72
3	A	92.77
4	B	73.79
5	D	32.13
6	C	54.44
7	C	77.71
8	D	56.19

Question	Answer	% Correct
9	D	75.06
10	A	57.60
11	D	14.63
12	B	49.80
13	A	61.36
14	B	69.90
15	C	77.92

## **PART B**

### **Question 16**

Most candidates could describe how homologous structures provide evidence for a common ancestor. Most could also name a transitional form, however the spelling of the scientific name was poor. Many candidates did not fully explain how the transitional form supports Darwin's Theory and some were unable to correctly link the transitional form to the two appropriate groups. A few candidates described the pentadactyl limb as a transitional form.

### **Question 17**

Many candidates were able to score well in this question although some did not use a biological reason to explain the advantage of ear size. Most candidates demonstrated an understanding of adaptations. A small number of candidates did not identify which adaptation was structural and which was behavioural.

### **Question 18**

Most candidates answered this question well. However, a small number of candidates included genetic variation which was not required. Most candidates were able to name an environmental factor and were aware of the importance of controlling variables and using multiples or repeating the experiment. Few candidates included instructions to make a quantitative observation of the results.

### **Question 19**

This question presented some interpretational problems for candidates with some candidates giving unnecessarily long and detailed responses. Some candidates used ambiguous terms in their responses. In responding to the part about grafts, candidates needed to make it clear which type of graft they were answering.

### **Question 20**

Most candidates understood the question, however many were confused about both strata being laid down in the Triassic Period. Candidates needed to explain that the fossils found in the lower strata were older due to superposition which some candidates did not understand.

### **Question 21**

This question was well answered considering the complexity of the test described. In (a), most candidates were able to recognize that the presence of antibodies was identified by a green marker molecule. In (b), the use of the term "specific" caused some problems. Part (c)(i) was the most difficult part as candidates needed to understand all steps in the process, especially as rinsing the blood off the slide was to remove antibodies that had not bound to the virus protein and were not specific for mumps. Part (c) (ii) was well answered.

### **Question 22**

This question was not well answered and many candidates demonstrated a poor understanding of terminology. There was confusion between antigen, pathogen and antibody and candidates gave poor definitions of immunisation and demonstrated a poor understanding of "boosters". Some candidates confused disease and causative agent while some used AIDS and HIV as the same thing.

**Question 23**

Most candidates answered this question well, however some showed poor organisation of their answers by not relating part (b) to part (a). Some candidates also repeated urination in their responses as a method of water loss. Sweating was a very common answer.

**Question 24**

This question was well answered with most candidates able to discuss the difference between the two plants in terms of support mechanisms. However some candidates were not able to name water loss adaptations. In general, the diagrams of the plant cell and the plasmolysed cell were well done. There was evidence of some candidates showing the cell wall collapsing which is incorrect. Also a number of candidates suggested that the gum tree relies on lignin for support rather than discussing wood.

**Question 25**

This question produced a range of responses with many candidates unable to infer why crossing over did not occur in mitosis. In general, the diagrams were not well drawn, often with different genes occupying corresponding loci on homologous chromosomes.

**PART C****Question 26**

This question was generally well answered. Most candidates were able to complete both punnett squares accurately and to determine both the genotypes and the phenotype ratios.

**Question 27**

Some candidates were unable to distinguish between a strategy and a defence mechanism and there was some confusion in (b) whether the question was referring to the host or the parasite. There was also an interpretational problem in part (c) with many candidates stating how the parasite transfers. Secondary hosts and vectors were often confused.

**Question 28**

Candidates need to be aware of the use of appropriate scales and graph types. In part (b) many candidates were able to give interpretations but few could extend this skill to evaluation. The concepts of treatment and control were often confused in part (c).

**Question 29**

This question was generally well answered but a significant number of candidates demonstrated a poor understanding of the mechanism of osmosis.

**Question 30**

This question was straightforward with few non-attempts. Some candidates listed rather than described features and some misunderstanding about water loss/retention was evident. Most candidates were able to choose the correct alternatives in part (b), but some were unable to correctly articulate the reasons for their choice.

**Question 31**

This question was not attempted by a significant number of candidates with many unable to grasp the significance of a value Q rather than a number e.g. 23 chromosomes. Part (b) was a higher order of difficulty and few students were able to demonstrate a clear understanding of the process of DNA replication.

## Section II – Electives

### Question 32

This question was generally well answered and the standard of Biology was sound. However, some candidates' responses were too general and needed to be more specific. The question attempted to engage candidates in higher level thinking skills which the better candidates were able to demonstrate.

In part (a), responses to the cartoons were evenly spread between Cartoon A and Cartoon B. Generally, more candidates were able to explain the significance of A, but fewer were able to explain the reasons for the distribution of Australian marsupials. In part (b), few candidates scored full marks as they were unable to fully relate the stimulus material to that studied during the course. Part (c) (i) was well answered, indicating that candidates were able to interpret the data provided. In part (c)(ii), most candidates were able to identify abiotic or biotic variables relevant to the data presented, but fewer were able to justify the measurement of that variable. Part (d) was well answered with candidates demonstrating an ability to relate factors for the success of species introduced in the context of the question. In part (e), the majority of candidates could describe factors to account for the increase in the rate of extinction of native species. Terms like predation and competition for resources were common. In part (f), candidates could accurately name abiotic factors, equipment used to measure them and the techniques used to measure the distribution and abundance of plants and animals. Many candidates had difficulty in describing how to investigate these factors and techniques. There was some confusion evident between distribution and abundance.

### Question 33

The majority of candidates demonstrated a sound understanding of biochemistry and cell functions. However, some candidates had difficulty explaining fermentation – in particular the pathways to convert sugar into ethanol and the rate of production of ethanol under aerobic conditions. Ethanol's rate of production under anaerobic conditions was well explained. While photosynthesis was generally well understood, some candidates had difficulty explaining how ATP and oxygen aided the conversion of carbon dioxide to starch. Another area of difficulty for some candidates involved the drawing of labelled diagrams of typical plant cells in particular zones in the plant root. In general, specialised plant and animal cells were well understood (apart from drawing them) and the specificity and function of enzymes were well answered.

### Question 34

This question was generally well answered. In particular, the physiology of the eye was well understood and the drawings were appropriate. Most candidates correctly referred to the Na/K pump, whereas some incorrectly referred to the Na pump and K pump. Other areas well answered included the comparison between the nervous and endocrine systems, the response of a target cell to a pituitary hormone, labeling parts of a neurone, naming and identifying motor and sensory neurons and naming two tissues controlled by the autonomic nervous system. Some areas not answered well included the concept of receptor sites and the specificity of hormone action and the concept of feedback. There was also evidence of incorrect naming of pituitary hormones and the specific functions of hormones. In part (c)(i), some candidates found difficulty in contrasting, probably because a comparison is the more usual way to approach this section. Candidates often wrote of the differences between plants and animals rather than the differences between their hormones.

### **Question 35**

Parts (a) and (b) required candidates to give advantages and disadvantages of both the classification hierarchy and the use of common names. Candidates' knowledge of their detailed study was not examined and two questions were asked in the negative. Some candidates had difficulty in adjusting their thinking towards this type of questioning in relation to past papers. Candidates generally scored better in parts of the question which involved direct learning of material, such as the levels of classification, the disadvantages of using common names and the advantages of the binomial system. They had more difficulty in areas where conceptual understanding was necessary, for example the mechanisms of speciation (sympatric speciation as opposed to allopatric speciation). Candidates also confused class and phylum features in part (d)(iii). They tended to give specific taxonomic features for the plant studied in part (e)(i) rather than ones that could be used to distinguish unknown species. The concept of a cline still causes confusion.

### **Question 36**

This question examined the syllabus well with a good coverage of most parts. There was a range of levels of difficulty to discriminate candidates' responses. There was some evidence of confusion of terms such as palaeontology and archaeology, and a number of candidates indicated Lamarkian evolution rather than Darwinian in their responses. A small number of candidates responded that early hominids were "meat eating savages that were quadrupeds" indicating a poor understanding of this topic. There was some evidence of a poor understanding of the time span involved in human evolution in parts (e)(ii) and (iii).

### **Question 37**

Most candidates were able to answer each part of the question to a reasonable standard. Protein synthesis, the possible effects of a mutation during transcription, and the benefits and ethical issues of the Human Genome Project were well answered. Less well answered were the parts that required candidates to explain why all mutations are not harmful and the question on mapping. There was also some confusion between multiple alleles and polygenic inheritance, and that cross breeding is really a form of artificial selection. A wide range of notation was given when writing genotypes. In part (g) candidates needed to realise that the fifth base was the start of the code for methionine and the starting point of transcription.

### **Question 38**

There is again strong evidence that some candidates attempt this elective without having the necessary learning experiences from this part of the syllabus. Candidates need to ensure that responses are accurate, concise and involve the use of appropriate scientific language. Reliance on general knowledge and writing in generalisations should be discouraged. In part (a) candidates were unable to express themselves effectively and scientifically to comment critically on the suggested methods for removing the exotic species along the drain and creek. Candidates are reminded to read the specific instructions in each part of the question to ensure that their answers are directed towards these instructions. In part (b), many candidates did not refer to changes in human activity, but rather to the results of these changes. Parts (c), (d), (e) and (g) were generally well answered. In part (f), candidates frequently did not read the two parts of the question with sufficient care, leading to incorrect placement of answers in the answer book.