



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

LEAVING CERTIFICATE EXAMINATION 2009

BIOLOGY

**ORDINARY LEVEL CHIEF EXAMINER'S REPORT
HIGHER LEVEL CHIEF EXAMINER'S REPORT**

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1. General Introduction

The present Leaving Certificate syllabus for both Ordinary Level and Higher Level Biology was introduced in its revised form in 2002 and was examined for the first time in 2004. The syllabus is assessed by means of a terminal written examination and candidates are allowed three hours to complete the examination.

The structure and rubrics of both the Ordinary Level and the Higher Level examination papers are the same. There is a total mark allocation in each paper of 400 marks. Each paper consists of fifteen questions and is divided into three sections. Section A contains six questions requiring short constructed or selected responses. Each question is allocated 20 marks. Candidates are required to answer five of the six questions in this section. Section B contains three questions based on the mandatory practical activities detailed in the syllabus, each requiring concise constructed answers. Each question in section B is allocated 30 marks and candidates are required to answer two of these questions. Candidates' answers to the questions in Sections A and B are required to be given in the spaces provided on the question paper. Section C contains six questions requiring longer constructed responses to be written in an answer book. Each question is allocated 60 marks. Candidates are required to answer four of the six questions in Section C.

Table 1 shows the number of candidates taking Biology in the Leaving Certificate in the years 2007 – 2009 and those numbers expressed as a percentage of the total Leaving Certificate cohort in each of those years. Both the total number and percentage of candidates taking Biology have increased each year since 2007. The percentage of candidates taking Ordinary Level has declined and the number and percentage taking Higher Level has increased.

Table 1.

Number of candidates taking Biology in the Leaving Certificate at each level and the percentage of the total Leaving Certificate cohort in the years 2007 – 2009.

		2007	2008	2009
OL	n	8,269	8,285	7,999
	%	16.26	15.89	14.76
HL	n	17,523	18,322	20,102
	%	34.45	35.14	37.09
Total	n	25,792	26,607	28,101
	%	50.70	51.03	51.85
*Total LC		50,870	52,144	54,196

* This total includes school candidates, repeat candidates, external candidates and VTOS/PLC candidates. Leaving Certificate Applied candidates are excluded from all totals.

Table 2 compares the number and percentage of candidates taking Biology at Ordinary and Higher levels in the years 2007 – 2009. While the number of Biology candidates taking Ordinary Level increased slightly from 2007 to 2008 and decreased markedly from 2008 to 2009, the percentage taking Ordinary Level has shown a steady decline since 2007. Both the number and percentage of Biology candidates taking Higher Level have increased since 2007.

Table 2.

Number and percentage of candidates taking Biology at Ordinary and Higher levels 2007 – 2009.

		2007	2008	2009
Total		25,792	26,607	28,101
OL	n	8,269	8,285	7,999
	%	32.06	31.14	28.47
HL	n	17,523	18,322	20,102
	%	67.94	68.86	71.53

Table 3 shows the female-to-male ratio in Biology, totally and at each level, decreasing steadily from 2007 to 2009. The decrease is greatest at Higher Level.

Table 3.

Number, percentage and ratio of female and male candidates taking Biology, totally and at each level, 2007 – 2009.

		2007	2008	2009
Total	n	25,792	26,607	28,101
Total Female	n	17,354	17,555	18,268
	%	67.28	65.98	65.00
Total Male	n	8,438	9,052	9,833
	%	32.72	34.02	34.99
Total Female:Male		2.06:1	1.94:1	1.86:1
OL Female	n	5,273	5,266	5,024
	%	63.77	63.56	62.81
OL Male	n	2,996	3,019	2,975
	%	36.23	36.44	37.19
OL Female:Male		1.76:1	1.74:1	1.69:1
HL Female	n	12,081	12,289	13,244
	%	68.94	67.07	65.88
HL Male	n	5,442	6,033	6,858
	%	31.06	32.93	34.12
HL Female:Male		2.22:1	2.04:1	1.93:1

This report should be read in conjunction with the examination paper(s) and the published marking scheme(s). These are available on the State Examinations Commission's website www.examinations.ie

2. Ordinary Level

2.1 Introduction

This section of the report deals with the Ordinary Level Biology examination from the perspective of performance, conclusions and recommendations.

2.2 Performance of Candidates

Table 4 shows the percentage of candidates achieving each grade at Ordinary Level Biology in the years 2007 – 2009.

Table 4.

Total candidature and percentage achieving each grade at Ordinary Level Biology 2007 – 2009.

Year	Total Candidature	%A	%B	%C	%ABC	%D	%E	%F	%NG	%EFNG
2007	8,269	2.7	21.8	33.3	57.8	27.1	10.2	4.4	0.4	15.0
2008	8,285	4.8	25.0	33.5	63.3	25.7	8.0	2.8	0.2	11.0
2009	7,999	3.6	22.7	32.8	59.1	25.8	9.9	5.0	0.4	15.3

2.3 Analysis of Candidate Performance

Table 5 shows the rank order of questions, section by section, of candidate answering in the Ordinary Level examination from the point of view of number of attempts per question and number of marks earned per question. These data are taken from a random sample of 460 examination scripts (5.75% of the total candidature).

Table 5. Rank ordering of attempts and marks per question, Ordinary Level Biology 2009.

Question Number	Topic	% Attempts	Rank Order - Attempts	Average Mark	Rank Order - Marks
Section A					
1	Carbohydrates	80.0	4	10.5	3
2	Ecology	99.1	=1	17.0	1
3	Evolution	67.6	6	9.0	5
4	Cell division	99.1	=1	16.1	2
5	Blood	92.6	3	10.3	4
6	Plant responses	78.3	5	6.2	6
Section B					
7	Food	98.0	1	12.4	2
8	Osmosis	56.3	3	14.5	1
9	Seed germination	80.0	2	7.2	3
Section C					
10	Ecology	84.1	1	37.7	1
11	Genetics	48.7	6	22.0	4
12	Microorganisms	57.4	5	20.0	6
13	Human vascular system	81.1	2	31.1	2
14	Plant tissues/ Urinary system/ Plant reproduction	68.3	3	23.8	3
15	Photosynthesis/ Respiration/ Enzymes	61.3	4	20.6	5

Section A

In Section A, Questions 2 and 4, on ecology and cell division respectively, were both the most popular and the best answered questions. Questions 3 and 6, on evolution and plant responses respectively, were both the least popular and the most poorly answered questions.

Question 1. Carbohydrates

Many candidates found this question difficult. It was omitted quite often and, when attempted, scores achieved varied considerably.

Question 2. Ecology

This was the best answered question in Section A, with many candidates achieving full marks. Candidates appear to favour the lay-out used in this question.

Question 3. Evolution

The least often attempted and second-lowest scoring question in this section. A level of confusion was evident between the concepts of evolution and natural selection.

Question 4. Cell division

Equally the most often attempted question in this section and the second-best answered one. This lay-out also seems to be one that appeals to candidates.

Question 5. Blood

This question was attempted by most candidates but only mid-level marks were achieved in general. In part (b), a lack of understanding of the meaning of the term 'component' was evident.

Question 6. Plant responses

This was the second-least often attempted question and the most poorly answered one. Candidates had difficulty with the terms required in parts (a), (c) and (e) and showed a lack of understanding of the transport of growth regulators in part (d).

Section B

In Section B, a very high proportion of candidates answered only two out of the three questions, most often omitting Question 8. However, when Question 8 was attempted it was the best answered question of the three. Question 7 was by far the most often attempted question and the second-highest scoring one in this section.

Question 7. Food tests

This question was attempted by 98% of candidates. In parts (b) 1 (ii) and (b) 2 (ii), a significant proportion of candidates did not give both the initial and final colour of the test solutions as asked.

Question 8. Osmosis

This was the best answered question in this section when attempted but was the least often attempted question. In part (a) (ii) a poor understanding of the role of osmosis in

plants was evident. Part (b) was particularly well answered, especially parts (i), (ii) and (iii).

Question 9. Digestion in germinating seeds

A very common error seen in the answering of this question was the assumption that the practical activity to be addressed was the one to investigate the conditions necessary for germination. The answering in respect of the question as asked was very poor.

In the answers to Questions 8 and 9 a good deal of confusion was seen between the understanding of results and the conclusions drawn from those results.

Section C

In section C, Questions 10, on ecology, and 13, on the human vascular system were, in that order, both the most often attempted and the best answered questions in the sample. Question 11, on genetics, and Question 12, on micro-organisms, were the least often attempted and Questions 12, on micro-organisms, and 15, on biochemistry, were the most poorly answered.

Question 10. Ecology

As seen in previous years, the ecology question was the most frequently attempted and best answered question. Many candidates earned most of their marks for this question in part (c).

In part (a), the difference between the terms *biotic* and *abiotic* was generally well known but the term *edaphic* caused problems.

In part (b) (i), most candidates correctly defined the term *quantitative* but very few could explain what a qualitative study was.

In part (c) (i), in relation to the definition of the term *species* most answers omitted the points about interbreeding and producing fertile offspring.

Question 11. Genetics

As frequently seen before, the question on genetics was the least often attempted one and was also the third-most poorly answered question. Where it had been attempted the results varied considerably and it was evident that some candidates had a good grasp of this topic while others were completely unprepared.

In part (a) *phenotype* was the best known of the three terms. Many candidates confused *heterozygous* with homozygous and only a small proportion of candidates could correctly explain *incomplete dominance*.

The answering in part (b) varied considerably from completely correct to very poor. In part (c), only parts (iv) and (v) were consistently well answered.

Question 12. Micro-organisms

This question was the second-least often attempted and the most poorly answered.

In part (a) (ii), most candidates correctly explained decomposition but had trouble naming two groups of micro-organisms – very many giving answers such as ‘snails’, ‘earthworms’ and ‘insects’ instead.

In part (b) (vi), many candidates equated *pathogenic* with harmful bacteria but did not go on to explain that they are harmful because they cause disease. Part (b) (vii) was often omitted or, when answered, only one example was given. In general, candidates exhibited a poor knowledge of viruses.

Question 13. Human vascular system

This was the second-most often attempted and second-best answered question in Section C.

In part (a), part (i) was best known and part (iii) least well known. Where marks were lost in this question it was generally due to lack of attention to detail and not adequately following the instructions in the question’s various parts.

In part (b) (v), a noticeable group of candidates gave the average human resting heart rate as 5 -10 beats per minute. In part (b), (vii) few candidates identified the coronary arteries.

In part (c) many candidates wrote their answers in the table on the question paper despite clear instructions to copy the table into their answer book.

Question 14. Plant tissues/human urinary system/plant reproduction

In this question candidates were required to answer any two out of three parts. Question 14 was both the third-most attempted and third-best answered in Section C. Part (b), dealing with the human urinary system, was the most popular of the three parts. Parts (a) and (c) dealt with plant tissues and plant reproduction respectively and as in previous years these topics proved relatively unpopular with candidates. Perhaps, because of the appearance of two parts of the question dealing with plant topics, it was noticed this year that candidates generally attempted only two parts of the question – unlike other years when most candidates attempted all three parts, letting the marking process decide on their two best efforts.

Part (a). Part (iii), the drawing of a longitudinal section of phloem tissue, was answered very rarely and when drawn most diagrams were poor and achieved few marks. In (iv) the functions of ground tissue were not well known. In (v) an adaptation of xylem for water transport was poorly known.

Part (b). The labeling of the kidney diagram proved problematical for many candidates; many confusing cortex and medulla, and ureter and urethra. In (iii) the site of blood filtration was not well known. In (vi), many candidates found it difficult to give a second other human excretory organ.

Part (c). This part was poorly answered in general. In (i), answers were mostly incorrect and the most common wrong answer was 'bud'. In (iv), most candidates recognised that dormancy is an inactive period and, while (v) was often omitted, when answered, candidates usually gave the correct reasoning. Part (vii) was frequently omitted and when answered was rarely correct.

Question 15. Photosynthesis / respiration / enzymes.

In this question candidates were required to answer any two out of three parts.

Question 15 was the third-least attempted and the second-most poorly answered in Section C. Part (c), on enzymes, was omitted more often than (a), on the biochemistry photosynthesis or (b), on respiration.

Part (a). This part was not well answered. Few candidates were able to give the complete balanced equation for photosynthesis. Parts (iii) and (iv) were frequently omitted and answered poorly when attempted.

Part (b). This part was poorly answered. Part (i) was often omitted but was answered well when attempted. In part (iii) the answering revealed that candidates were not familiar with the details of this mandatory practical activity, especially with the test to show that alcohol had been produced.

Part (c). Parts (i) and (ii) were rarely attempted but were well answered when attempted. In part (iii), the word *substrate* was well understood but *catabolic* proved much less so. Once again here the answering of parts (iv) and (v) showed a lack of knowledge of the mandatory practical activity of enzyme immobilisation.

2.4 Conclusions

- In general, candidates followed the instructions on the examination paper correctly and attempted to answer the question that was being asked. Exceptions to this generality were in Question 9 (b) and Question 13 (c). In Question 9 (b) many candidates gave details of the investigation into the effects of water, oxygen and temperature on seed germination instead of the investigation to show digestive activity during germination. In Question 13 (c) many candidates wrote their answers in the grid on the question paper instead of in a copy of the table in their answer book as directed. Otherwise, in the vast majority of cases the manner in which candidates presented material was satisfactory.
- The standard of answering was somewhat disappointing in a number of cases, and examiners noted that candidates who received E, F and NG grades did not demonstrate, in many cases, the required knowledge, detail and accuracy required to reach a grade D.
- In general, the answering in Section B was not as good as would be expected. This may have been due to the particular mix of topics in the section but may also indicate that, at Ordinary Level, the mandatory practical activities are not being given the emphasis required by the syllabus. The latter impression is supported by the observation that in Section C in Questions 11 (c) (vi), 15 (b) (iii) and 15 (c) (v) and (vi), all of which dealt with aspects of various mandatory activities, the answering was not as good as one would expect. Question 10 (b) which dealt with ecological surveying was, however, well answered.

2.5 Recommendations to Teachers and Students

It is recommended that teachers

- note that all topics in the syllabus not specifically designated as topics to be studied by Higher Level candidates only, are integral parts of the syllabus for Ordinary Level candidates and will continue to be examined
- regard the ‘Biology Syllabus’ and ‘Guidelines for Teachers’ documents as the primary sources of what is to be studied and the appropriate depth of treatment that applies to the various topics. These documents, together with the document ‘Laboratory Handbook for Teachers’, are available on the website of The Department of Education and Science at www.education.ie
- provide opportunities for students to cover all Ordinary Level topics in appropriate depth
- provide opportunities for students to practise reading questions fully and to carefully elucidate key points
- advise students to read instructions in questions carefully, especially where diagrams or tables are required to be copied from the question paper into an answer book
- advise students not to rely on any key word or form of such word included in a term when defining or explaining the meaning of the term. For example, if *conservation* is to be defined or explained, students should not rely in an answer on the word ‘conserve’ or any of its forms
- provide opportunities to students to carry out all mandatory practical activities in field and laboratory, and to explain the reasons behind the various steps in each activity
- give appropriate time and emphasis in class to the ‘Contemporary Issues and Technology’ sections of the syllabus

It is recommended that students

- use past examination papers for practise
- read questions fully and carefully so it is clear what exactly is being asked
- follow instructions in questions
- practise drawing large, tidy, accurate diagrams and labelling their parts clearly
- learn to explain compound terms in full
- learn to define terms without relying on key words from the term.

3. Higher Level

3.1 Introduction

This section of the report deals with the Higher Level Biology examination from the perspective of performance, conclusions and recommendations.

3.2 Performance of Candidates

Table 6 shows the percentage of candidates achieving each grade at Higher Level Biology in the years 2007 – 2009.

Table 6.

Total candidature and percentage achieving each grade at Higher Level Biology 2007 – 2009.

Year	Total Candidature	%A	%B	%C	%ABC	%D	%E	%F	%NG	%EFNG
2007	17,523	19.7	27.2	25.0	71.9	20.3	6.0	1.6	0.2	7.8
2008	18,322	16.9	27.3	27.5	71.7	20.7	6.0	1.6	0.1	7.7
2009	20,102	16.5	27.0	26.8	70.3	21.1	6.8	1.5	0.2	8.5

3.3 Analysis of Candidate Performance

Table 7 shows the rank order of questions, section by section, of candidate answering in the Higher Level examination from the point of view of number of attempts per question and number of marks earned per question. These data are taken from a random sample of 1120 examination scripts (5.57% of the total candidature).

Table 7. Rank ordering of attempts and marks per question, Higher Level Biology 2009.

Question Number	Topic	% Attempts	Rank Order - Attempts	Average Mark	Rank Order - Marks
Section A					
1	Carbohydrates	95	2	14.0	2
2	Plant responses	90	4	12.1	4
3	Ecology	98	1	15.0	1
4	Human skeletal system	73	5	8.4	6
5	Cell division	92	3	13.7	3
6	Genetics	71	6	9.8	5
Section B					
7	T.S. of dicot stem	90	1	19.0	1
8	Seed germination	71	3	14.3	3
9	Enzyme immobilisation	88	2	17.4	2
Section C					
10	Genetics and evolution	74	3	32.4	6
11	Ecology	87	1	49.2	1
12	Respiration and photosynthesis	73	5	39.2	2
13	Human circulatory and breathing systems	73	4	38.0	4
14	Human reproduction/ Fungi	81	2	38.1	3
15	Plant reproduction/ Human eye/ Mixed notes	63	6	34.7	5

Section A

In Section A, Question 3, on ecology, and Question 1, on carbohydrates, in that order, were both the most often attempted and the best answered questions. Question 6, on genetics, was the least often attempted and the second-most poorly answered while Question 4, on the human skeletal system was the second-least often attempted and the most poorly answered.

Question 1. Carbohydrates

(a) Most candidates answered this correctly.

(b) A common error here was that candidates only explained the *poly-* part of the term giving answers such as “many monosacharides” or “a chain of monosacharides”. Where terms such as polysaccharide are to be explained the full meaning of the term is expected.

(c) Starch was the most popular answer here, followed by ‘glycogen’ and ‘chitin’.

(d) Well answered.

(e) Many candidates gave ‘biuret’ here. Only a very small minority gave the chemicals used.

(f) Those that gave ‘biuret’ in (e) now gave ‘no heat needed’ here. ‘Boil’ was also a frequent answer.

Question 2. Plant responses

Most candidates answered (a) (b) and (c) correctly. Parts (d) (e) and (f) were also well answered. The most common correct answers for (f) were “rooting powder”, “fruit ripening” and “seedless fruits”. The most common incorrect answers included “speed up growth”, “to feed plants” and “weedkiller” rather than “selective weedkiller”.

Question 3. Ecology

(a) Question 3 (a) asked candidates to define the word ‘*predation*’.

The answer required by the original marking scheme was as follows: “*Killing (or catching) and eating another animal*”.

The answer required following a review of the marking scheme at the appeal stage was as follows: “*Killing (or catching) and eating an animal (or an organism, or prey) or Killing (or catching) an animal (or an organism, or prey) for food.*”

As a result of this change in the marking scheme, the scripts of all candidates within 3 marks of the next highest grade boundary were re-examined.

(b) Almost all candidates answered this part correctly – the most commonly seen example was “fox and rabbit”.

(c) *Niche* was generally well answered.

(d) Most answers gave “photosynthesis” here with very few giving “protein synthesis”. A common error was “respiration”.

(e) Many candidates could not explain *edaphic*.

Question 4. Human skeletal system

(a) This was the second-least often attempted question in Section A and the most poorly answered. The most common answers for (i) were “head” for A and “shaft” for B, although “epiphysis” and “diaphysis” were sometimes given. Common errors were “red marrow” for C and “medullary cavity” for D.

In (ii), many candidates could not give a correct location for the discs – answers such as “in the vertebrae”, “around the vertebrae” and, very commonly, “in the spine” were seen. Part (iii) was also poorly answered – a common answer seen was “to protect the spinal cord”.

(b)(i) Only a few answers had “stores fat” and fewer still referred to “converting to red marrow”. A common incorrect answer was “to make white blood cells”. In contrast, most gave the correct answer for (ii), with a small minority giving “makes blood”. For many candidates this was the only part of Question 4 that they answered correctly.

Question 5. Cell division

Generally this question was well answered.

(a) While most answered “anaphase”, a common error was “metaphase”, with a few giving “telophase”.

(b) Most answers were correct.

(c) Both parts were well answered. However, for A sometimes just “fibre” was given while for B the most common errors were “chromatin” and “DNA”.

(d) Common errors were “replication”, “multiplication” and “growth”.

(e) While “growth” and “repair” were often given, common errors were “replication” and “reproduction”.

(f) Most gave “root tip” or “meristem” here.

Question 6. Genetic engineering

This was the least often attempted and the second-most poorly answered question in this section.

(a) The definitions of genetic engineering were mostly correct.

(b) Very few answers gave three correct processes – common answers not accepted included “insertion”, “transcription”, “translation”, “profiling” and “screening”.

(c) In C 1, insulin was the most common answer although sometimes it was incorrectly qualified by e.g. “sheep” or some other animal. In C 2, many varied correct answers

were given, although “cloning” and “Dolly the sheep” were common errors. In C 3, the most common error was of the type “putting vitamins into rice”.

Section B

In Section B the three questions fell into the same order from the perspective of both number of attempts and number of marks earned. Question 7, on the T.S. of the dicot stem, was most often attempted and highest scoring, with Question 9, on enzyme immobilisation, next and Question 8, on digestive activity in germinating seeds, third. Many candidates attempted all three questions in the section.

Question 7. Transverse section of a dicot stem

Similarly to *polysaccharide* in Question 1 (b), the term ‘dicotyledonous’ is expected to be comprehensively addressed, with full explanation being given for both the ‘di-’ part of the word and the ‘cotyledonous’ part. Failure to do this led to most candidates failing to earn any marks for part (a) (i).

Many candidates answered parts (b) (i) and (ii) in continuous fashion across the two parts. Most detail was concentrated in describing the preparation of the slide and, in many cases, little room was left to describe the microscopic examination. Some candidates wrote “put the slide under the microscope” which did not earn any marks. The light source, condenser and iris diaphragm were rarely referred to.

Question 8. Digestion in the germinating seed

Part (a) (i) was well answered with part (ii) considerably less well answered. Most candidates missed the point of digestion being necessary in germinating seeds so that the products of digestion may be absorbed by the developing embryo.

In part (b) (i), many answers failed to address both parts of the term to be explained. The rest of part (b) was well answered with some confusion being evident between the control plate and the experimental plate in (iv) and between results and conclusions in (vi).

Question 9. Enzyme immobilisation

Although this question was the second-highest scoring in this section, it was the question that was most likely to be awarded full marks. All part (a) and (b) (i) were well answered. In (b) (ii) and (iii), despite the emphasis in the question, many candidates gave the details of the immobilisation procedure itself. Some candidates, having described the correct activity, did not describe the test for the named product.

Section C

In Section C, Question 11, on ecology, was the most often attempted and the highest scoring. Question 14, with two parts on human reproduction and one on fungi, was the second-most often attempted and third-best answered. Question 10, on genetics and evolution, was the third-most often attempted but was the lowest scoring in the section. Question 13, on the human circulatory and breathing systems, was both third-least often

attempted and third-most poorly answered. Question 12, on respiration and photosynthesis, was the second-least often attempted but when answered was the second-highest scoring in this section. Question 15, on plant reproduction; the human eye; and containing a part requiring notes to be written on any three of five disparate topics, was the least often attempted and the second-most poorly answered question in Section C.

Question 10. Genetics and evolution

Part (a) was poorly answered, in general. Knowledge of Mendel's Law of Segregation was poor. There was some confusion between the 1st and 2nd Laws. In (ii), most answers did not name two organelles with many failing to name one. "Ribosome" was a common error.

Parts (b) (i) (ii) and (iii) were well answered. In part (iv), it was evident that some candidates were very familiar with and proficient in doing this type of cross while others demonstrated a poor understanding of the topic.

In (c), parts (i) and (ii) were well answered. Part (iii) was poorly answered, in general. Part (iv) asked candidates to state two types of evidence in support of the theory of evolution. The syllabus specifies that one source of evidence that supports the theory of evolution should be learned. This was taken into account during the marking and candidates who stated one correct source were awarded full marks for this part. Many answers contained two correct sources.

Question 11. Ecology

This question was both the most often attempted and the highest scoring question in Section C.

In part (a) (i), some answers were not awarded marks because they relied on the words 'conserve' or 'conservation' to explain the term *conservation*. In part (ii) some answers did not describe the benefit of a named conservation practice.

Part (b) was very well answered.

In part (c) (i), the difference between the terms *qualitative* and *quantitative* still proves problematical for some candidates. In part (iv), quite a few answers contained the incorrect opinion that it is an error if a quadrat falls in the same place twice in a random sampling exercise.

Question 12. Respiration and photosynthesis

This question was the second-least often attempted but when answered was the second-highest scoring in this section.

Part (a) was poorly answered.

Part (b) was generally well answered. In (b) (i), many answers gave the type of respiration in the first stage i.e. 'anaerobic' rather than the name of the first stage i.e. 'glycolysis'. In part (b) (ii), a tendency was noticed in some answers to give "alcohol"

as the major product of anaerobic respiration in yeast cells, where the syllabus specifies the more exact 'ethanol'. In (v) at least half the answers had 'Krebs cycle' spelled as "Kerbs cycle".

Part (c) was usually well answered. However, failure to mention time as a factor when measuring rate continues to be a problem in many cases. In part (v), many candidates interpreted the question to mean that the construction of the curve should be described in words, rather than explaining the reason behind the curve having its particular shape.

Question 13. Human circulatory and breathing systems

This was both third-least often attempted and third-most poorly answered question in Section C.

A marked lack of in-depth knowledge of the human circulatory and breathing systems was evident in the answering here. In (a) (i), "pulmonary" was often given but 'systemic' was rarely seen.

In (b) (i) and (ii), answers tended to be vague and in (iv) and (v), knowledge of the nodes was poor.

In (c) (iii), most answers gave "asthma" or, less commonly, "bronchitis" as the disorder of the breathing system, but some answers to the 'cause, prevention, treatment' part were quite poor, despite these being the only breathing disorders specified in the syllabus.

Question 14. Human reproduction/fungi

In this question candidates were required to answer any two out of three parts. This was the second-most often attempted and the third-best answered question in this section. In a large proportion of the answers all three parts of the question were attempted.

Parts (a) and (b) were both on the human reproduction system with (a) focusing on the female system and (b) addressing the development of the embryo and birth. Well drawn diagrams were presented by most candidates and it was clear from the answering that the structure and functions of the female system are well understood.

In (b) (i), very few references were made to the barrier function or the hormonal function of the placenta. Very good and complete descriptions of how birth occurs were seen in most answers. In (iv) the term *in vitro-fertilisation* was required to be explained. As already mentioned in relation to similar compound terms, all parts of the term are expected to be explained – in this case the *in-vitro* part and the *fertilisation* part.

Part (c) dealt with the fungus *Rhizopus* and was generally well answered.

Question 15. Plant reproduction/the human eye/notes on various topics

In this question candidates were required to answer any two out of three parts. Far fewer candidates answered all three parts of Question 15 than answered all three parts of Question 14.

Part (a) was generally well answered. A tendency was noticed in some answers to part (v) to confuse seed dispersal and pollination.

Part (b) was well answered. In (i), structure X, the choroid, was least well known. In part (iv), most answers omitted a reference to muscular contraction being involved in how the iris works.

In part (c) candidates were required to write notes on any three of five topics. In each topic credit was given for any three relevant points in an answer. In (i), most answers contained only two points worthy of marks. Mention of the various types of lymphocyte or their functions was rare. In (ii), many answers contained information on neurotransmitters that was not germane to the marking scheme. In (iii), many examples of homeostasis were seen without accompanying explanations of the 'how' or the 'why' required by the marking scheme. Part (iv) was well answered. Answers to part (v) generally contained only one scoring point.

3.4 Conclusions

- In general, candidates followed the instructions on the examination paper correctly and attempted to answer the question that was being asked. In the vast majority of cases the manner in which candidates presented material was satisfactory.
- The standard of answering was very high in some cases, with evidence being presented of comprehensive, in-depth coverage of the syllabus.
- The standard of answering was disappointing in a minority of cases, and examiners noted that candidates who received E, F and NG grades did not demonstrate the required knowledge, detail and accuracy required to reach a grade D.
- In general, the answering in Section B was of a high standard. This indicates that the mandatory practical work is being done by the students. Many candidates attempted all three questions in this section.

3.5 Recommendations to Teachers and Students

It is recommended that teachers

- regard the ‘Biology Syllabus’ and ‘Guidelines for Teachers’ documents as the primary sources of what is to be studied and the appropriate depth of treatment that applies to the various topics. These documents, together with the document ‘Laboratory Handbook for Teachers’, are available on the website of The Department of Education and Science at www.education.ie
- provide opportunities to students to cover all topics in appropriate depth, especially those topics specifically designated as Higher Level material.
- provide opportunities to students to practise reading questions fully and to identify key points.
- advise students to follow all instructions in questions, particularly instructions which require them to copy diagrams or tables from the question paper into an answer book
- advise students to learn and to explain compound terms in full
- advise students not to rely on any key word or form of such word included in a term when defining or explaining the meaning of the term. For example, if *conservation* is to be defined or explained, do not rely in an answer on the word ‘conserve’ or any of its forms
- provide appropriate opportunities to students to carry out all mandatory practical activities in field and laboratory and explain the reasons behind the various steps in each activity
- give appropriate time and emphasis in class to the ‘Contemporary Issues and Technology’ sections of the syllabus.

It is recommended that students

- use past examination papers for practise
- read questions fully and carefully so it is clear what exactly is being asked
- follow instructions in questions carefully
- practise drawing large, tidy, accurate diagrams and labelling their parts clearly
- learn to explain compound terms in full
- Learn to define terms without relying on key words from the term