



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE EXAMINATION 2006

SCIENCE

ORDINARY LEVEL AND HIGHER LEVEL

CHIEF EXAMINER'S REPORT

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1. INTRODUCTION

1.1 Assessment of Junior Certificate Science

The revised Syllabus for Junior Certificate Science, which was introduced in schools in September 2003, was examined for the first time in June 2006. The previous syllabi – Science (with Local Studies) and Science (without Local Studies) – which were introduced in 1989 and examined for the first time in 1992, have remained available to candidates in a small number of schools. This facility was originally set to continue until the 2007 certificate examinations but it has been extended by the Department of Education and Science for a further year. June 2008 will see the last examination of the two 1989 syllabi.

The structure of the assessment of the revised Syllabus for Junior Certificate Science is significantly different to the assessment that applied in the 1989 syllabi. The vast majority of candidates taking the 1989 syllabi opted for the Science (without Local Studies) option. All of these candidates were assessed by means of a terminal written examination only. In the case of the small number of candidates who opted for Science (with Local Studies) – typically < 2% of all candidates taking science – the assessment consisted of a terminal written examination and a second component where the candidate presented an investigative project which was assessed externally. In the terminal written examinations of both 1989 syllabi the examination papers were divided into sections and each section incorporated a very significant level of choice in questions.

The assessment of the revised Science Syllabus involves a total mark allocation of 600 at both Higher Level and Ordinary Level, and consists of three components:

(a) Practical Coursework

- | | |
|-------------------|-------------------|
| (i) Coursework A | (60 marks / 10%) |
| (ii) Coursework B | (150 marks / 25%) |

(b) Terminal Written Examination (390 marks / 65%)

Coursework A (60 marks / 10%) involves the completion of and the reporting on a course of 30 mandatory experiments/investigations. The completion of this element of the assessment is “signed-off” in schools and the claim for the marks for this component is transmitted with the Coursework B component.

Coursework B (150 marks / 25%) involves the external marking of reports on either two investigations prescribed by the State Examinations Commission (from a list containing three investigations) or the report on one larger investigation of the candidate’s own choice.

The Written Terminal Examination (390 marks / 65%) takes the form of a completion-style booklet with three equally weighted sections (Biology, Chemistry and Physics). Each of the three sections consists of three questions. Candidates are expected to attempt all 9 questions on the examination paper and there is no choice within the paper. The claim of marks for Coursework A together with the report(s) for the Coursework B component are presented in a pro-forma booklet which is transmitted for marking with the terminal written examination paper.

Details of the investigations nominated by the SEC were issued to schools in January 2006 in accordance with an agreed time-line for the coursework element.

1.2 Participation Rates in Junior Certificate Science

With the exception of 2004, participation rates in Junior Certificate Science examinations have remained relatively steady over the past decade. The typical participation rate in Science at Junior Certificate is c. 86%. Data for the last four years are provided in Table 1.

Table 1 Overall participation rates in Junior Certificate Science

Year	JC Candidature	Science Candidature	% of JC candidature taking Science
2003	59340	51090	86.1
2004	56864	47726	83.9
2005	56640	48877	86.3
2006	57784	50069	86.6

A total of six different examination papers in Science were presented at Junior Certificate in 2006 – three at Higher Level and three at Ordinary Level. They were as follows:

- A** Science (Revised Syllabus) – Higher Level and Ordinary Level
- B** Science without Local Studies – Higher Level and Ordinary Level
- C** Science with Local Studies – Higher Level and Ordinary Level

Options **B** and **C** will be examined for the last time in 2008.

Table 2 Number of candidates sitting each examination in 2006

	Examination & Level	No of candidates	Candidature for course	% of Science candidature
A	Science (Revised Syllabus) – Higher	30577	45253	90.4
	Science (Revised Syllabus) – Ordinary	14676		
B	Science (without Local Studies) – Higher	3092	4797	9.6
	Science (without Local Studies) – Ordinary	1705		
C	Science with Local Studies – Higher	0	19	0.04
	Science with Local Studies – Ordinary	19		

A total of 45, 253 candidates – 90.4% of those taking Science – sat the examinations for the Revised Syllabus. In this first cohort 67.6% of Science candidates took Higher Level and 32.4% took Ordinary Level. In 2005, 63.7% took Higher Level and 36.3% took Ordinary Level. The change in the way the science cohort has split between Higher Level and Ordinary Level represents a shift of almost 4% from Ordinary Level to Higher Level which – given the size of the entire cohort – has to be taken as significant.

The overall cohort at Ordinary Level in 2006 decreased by over 8% by comparison with the overall cohort at Ordinary Level in 2005. While it would be impossible to be absolutely certain as to the impact of this upward migration, it would be reasonable to assume that many of the candidates moving to Higher Level would have come from the top end of the cohort traditionally associated with Ordinary Level. In general, it would be expected that migration on such a scale would contribute to a decrease in the A and B grades at Ordinary Level.

A total of 4,816 candidates – 9.6% of those taking Science – took the Science with/without Local Studies examinations (i.e. the 1989 syllabi). Of these only 19 candidates, across 2 schools, took the Science with Local Studies option at Ordinary Level. No candidates presented for the Higher Level examination in the Science with Local Studies option.

Data on the participation rates in Science by gender are presented in Tables 3 and 4.

Table 3 Analysis of the Junior Certificate Cohort by gender in relation to participation in Science - 2006

2006*	Total Candidature	Number of Females	Number of Males	Percentage Female	Percentage Male
JC Cohort	57784	28511	29273	49.3	50.7
Taking Science	50069	23628	26441	47.2	52.8
Not taking Science	7715	4883	2832	63.3	36.7

* School-based candidates

Table 4 Gender breakdown of the Junior Certificate Science candidate cohort – 2006

2006	Total Science Candidature	Number of Females	Number of Males	Percentage Female	Percentage Male
Revised (HL)	30577	15627	14950	51.1	48.9
Revised (OL)	14676	5982	8694	40.8	59.2
Without LS (HL)	3092	1475	1617	47.7	52.3
Without LS (OL)	1705	541	1164	31.7	68.3
With LS (HL)	0	0	0	-	-
-With LS (OL)	19	3	16	15.8	84.2
Total (HL)	33669	17102	16567	50.8	49.2
Total (OL)	16400	6526	9874	39.8	60.2
Overall Total	50069	23628	26441	47.2	52.8

A number of observations are made in relation to the gender breakdown of the Junior Certificate cohort of candidates taking Science. Firstly, it is clear that there is an imbalance between the number of girls not taking Science and the number of boys not taking Science. Over 63% of those not taking Science at Junior Certificate are girls. Secondly, female candidates who take Science are more likely to take it at Higher Level. The report of the *Task Force on the Physical Sciences* drew attention to these phenomena in 2002. Of the girls who followed the Revised Science Syllabus, 72.3% attempted the examination at Higher Level while only 63.2% of boys following the Revised Science Syllabus attempted the Higher Level examination. There were also differences in the performance of girls and boys as measured by the assessment – with girls seen to outperform boys (c.f. Section 2 of this report).

2. PERFORMANCE OF CANDIDATES

2.1 Introduction

The results for the combined Higher Level candidature for 2006 and the combined Ordinary Level candidature for 2006 are presented in Tables 5 and 6.

While the overall Junior Certificate candidature shows an increase of 2.4% over that of 2005 and the corresponding increase in the overall Science candidature was 2.7%, the numbers taking Science at Higher Level show a significantly greater increase of almost 8%. This welcome migration of candidates from Ordinary Level to Higher Level may have contributed in part to a decrease in the A rate at both levels. However, it does not appear to have had any such adverse effect on the cumulative ABC rate at Higher Level. This cumulative ABC rate was achieved by about 26,500 of the overall Junior Certificate candidature compared with about 22,000 in the two preceding years.

2.2 Performance at Ordinary Level

Table 5 Total candidature at Ordinary Level, % breakdown by grade, and cumulative % at ABC grades and EFNG grades.

Year	Total	A	B	C	ABC	D	E	F	NG	EFNG
2003	18423	6.4	32.7	38.4	77.5	19.0	3.0	0.4	0.0	3.4
2004	18078	12.2	44.8	31.6	88.6	9.9	1.2	0.2	0.0	1.4
2005	18041	7.7	32.6	35.2	75.5	19.6	4.3	0.6	0.1	5.0
2006*	16335	1.9	24.8	45.4	72.1	21.4	4.2	1.8	0.2	6.2

* All programmes
2003, 2004, and 2005: Science (without Local Studies), Science (with Local Studies)
2006: Science (Revised), Science (without Local Studies), Science (with Local Studies)

The results for Ordinary Level show a number of changes on the results for previous years:

- The A rate at 1.9% has dropped significantly on the A rates for previous years
- The combined ABC rate of 72.1%, while at its lowest in the above table, is still reasonably close to that of previous years. The results obtained for 2004 were exceptionally high and may in some way be linked to the significantly reduced uptake of Science in that particular year.
- The combined EFNG rate of 6.2% is significantly higher than the rate for previous years and is to be regarded as being somewhat disappointing

It is generally recognised that the introduction of additional components in assessment tends to reduce the proportion of extreme grades awarded. This, however, is not the only factor that may have impacted on results at Ordinary Level. While there has been a significant decrease in the A rate, it is likely that this decrease may also be attributable, among other things, to the significant migration of candidates from Ordinary Level to Higher Level mentioned previously. At the other end of the grade

spectrum at Ordinary Level, the introduction of coursework seems to have had little or no positive impact, and the significantly higher EFNG rate is not what would be expected in these circumstances.

Examiners observed that the absence of one or other coursework element, and the presentation of very poor or incomplete coursework, made it difficult for some candidates to achieve a Grade D. It is noteworthy, for example, that initial data available to the SEC indicated that about 1,300 candidates (about 2.5% of total candidature) failed to claim any credit for Coursework A marks. Almost 70% of these were Ordinary Level candidates. As Coursework A accounts for 10% of the total marks for Science, this failure clearly had an impact on both the final grade awarded to the individual candidate and on the overall statistical outcome. The SEC did follow up the absences of a claim for Coursework A with schools subsequent to the issue of provisional results in September. This elicited some responses and a number of the candidates were subsequently awarded marks for Coursework A. However, since this is the smaller part of the coursework mark, only slight changes to the grade distribution resulted. More significantly, however, c. 500 candidates (> 80% of these were from the Ordinary Level cohort) did not present Coursework B. This clearly limited the chances of these candidates achieving even a grade D in the examination.

Examiners also observed that the combination of an absence of choice within the questions on the examination paper and an increased focus on questions assessing higher order skills contributed to making the examination paper particularly searching for Ordinary Level candidates.

2.3 Performance at Higher Level

Table 6 Total candidature at Higher Level, % breakdown by grade, and cumulative % at ABC grades and EFNG grades.

Year	Total	A	B	C	ABC	D	E	F	NG	EFNG
2003	32667	14.8	29.3	31.9	76.0	19.4	4.0	0.5	0.0	4.5
2004	29648	16.3	29.4	28.7	74.4	19.2	5.2	1.1	0.1	6.4
2005	30836	14.5	27.5	29.2	71.2	21.9	5.8	1.0	0.1	6.9
2006*	33612	10.5	30.9	37.7	79.1	18.4	2.0	0.4	0.1	2.5

* All programmes
 2003, 2004, and 2005: Science (without Local Studies), Science (with Local Studies)
 2006: Science (Revised), Science (without Local Studies), Science (with Local Studies)

The overall performance of candidates at Higher Level in recent years has remained satisfactory with a good standard being maintained. This year was no exception. However, changes to the nature and structure of the assessment almost certainly contributed to some of the changes observed in the grades awarded to candidates taking the revised Syllabus.

The results for Higher Level show a number of changes on the results for previous years:

- The A rate shows a decrease of 4% from 14.5% in 2005 to 10.5% in 2006
- The combined ABC rate has increased significantly from 71.2% in 2005 to 79.1% in 2006 and is the highest ABC rate in the last four years
- The EFNG rate has dropped from 6.9% in 2005 to 2.5% and is the lowest rate in the last four years.

The introduction of coursework elements in the revised science course, in which candidates ordinarily tend to score more freely, has contributed significantly to the changed grade profile at Higher Level. It is generally recognised that the introduction of additional components in assessment tends to reduce the proportion of extreme grades awarded. This is manifest in the results achieved at Higher Level. While the % achieving a grade C or higher has increased, the number of candidates achieving a grade A has reduced. At the other end of the grade spectrum the EFNG rate has fallen significantly.

Examiners expressed the opinion that the absence of choice in the written examination paper combined with an increased number of questions requiring candidates to utilise higher order skills did, however, make the terminal examination a particularly searching assessment instrument in the case of the revised course. Similar observations were made during the trialling of the sample examination papers for the revised syllabus in February 2006 and were alluded to in the report on that exercise which issued in March 2006.

The above factors may also have contributed to the number of candidates achieving a grade A decreasing relative to the corresponding statistics for the previous course.

Further familiarisation with the new approaches to teaching and learning central to the revised syllabus, the experience of the first examination, and the publication of the Marking Scheme together with the Chief Examiner's Report for 2006 may contribute towards redressing this situation somewhat over time.

Overall, the results achieved at Higher Level – particularly the significantly higher ABC rate and the equally significant lower EGNG rate – have to be read as a very positive outcome to the Revised Junior Science examination at this level.

2.4 Science (Revised Syllabus)

The results for candidates taking the Science (Revised Syllabus) examination are presented in Table 7 and Table 8.

Table 7 Breakdown of grades by gender for Science (Revised Syllabus) – Ordinary Level

Science (Revised) (OL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Female	1.2	26.3	47.7	20.0	3.1	1.6	0.1	5982
Male	1.1	22.7	46.3	22.9	4.8	1.9	0.3	8694
Overall	1.1	24.2	46.8	21.7	4.1	1.8	0.2	14676

Ordinary Level

At Ordinary Level there was a large decrease in the number of candidates receiving a grade A (from c. 8% to 1.1%). The percentage of candidates receiving a grade C or better was 72.1%. This represents a decrease of 6% – 7%. The percentage of candidates not achieving a grade D or higher increased by c.2% to 6.1%.

Table 8 Breakdown of grades by gender for Science (Revised Syllabus) – Higher Level

Science (Revised) (HL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Female	11.6	33.6	37.8	16.0	0.9	0.1	0.0	15627
Male	8.7	29.5	39.9	20.0	1.5	0.3	0.1	14950
Overall	10.2	31.6	38.8	17.9	1.2	0.2	0.0	30577

Higher Level

At Higher Level the number of candidates receiving a grade A was down on previous years by c. 4% - 5%. The number of candidates receiving grade C or better was up by c. 6% to 80.6% and the rate of candidates receiving less than a grade D at Higher Level was down to 1.2% from an average of over 6%. It is also observed that girls out-performed boys significantly at Higher Level.

Observations on the Statistics

A number of observations are made in relation to these statistics. The presence of the coursework elements of the assessment (with a total mark allocation of 35%) allowed candidates to achieve a significant quantity of marks before they sat the written examination. Thus, the quantity of marks a candidate required in the written paper to reach a grade D should be small, particularly in comparison with the previous examination where all the marks had to be gained on the day of the written examination. At Ordinary Level in particular, however, a significant number of candidates failed to complete either Coursework A and/or Coursework B and these candidates make up a substantial

proportion of those candidates who did not achieve a grade D or better. Details of these candidates are provided in Table 9.

Table 9 Numbers of candidates not presenting Coursework A or Coursework B

Level	Coursework for which no mark was awarded		
	Coursework A	Coursework B	Coursework A & Coursework B*
Higher	208	71	64
Ordinary	897	423	355

* Since these candidates did not present either Coursework A or Coursework B they are included in the figures for those not presenting Coursework A and in the figure for those not presenting Coursework B.

At Ordinary Level over 70 additional candidates only presented a report on only one of the two Coursework B investigations required – thus excluding themselves from any portion of 12.5% of the total available marks for the overall assessment.

Examiners expressed the view that the absence of choice in the written examination paper combined with an increased number of questions requiring candidates to utilise higher order skills did, however, make the Ordinary Level terminal examination a particularly searching assessment instrument. The level of choice enjoyed by candidates in previous examinations at this level not only allowed a level of topic avoidance when it came to course coverage but it also facilitated some avoidance of questions which required higher order skills. In the written examination of the revised Science Syllabus there is no choice in the examination paper. This contributes to making even some of the easier items discriminating and ensures that items which assess higher order skills cannot be avoided.

The examination also saw the inclusion of some questions which were in keeping with those used in PISA-type assessments which assess candidates' ability to deconstruct information and draw conclusions. Such questions tend to be text-heavy and can be difficult for those with poor literacy skills.

The combination of the successful, and welcome, migration of a significant number of what could be termed better ability candidates from Ordinary Level to Higher Level may also have contributed to lower grades.

Following an analysis of the outcomes of the 2006 examination and taking all of the above into account, a number of changes will be made to the Junior Certificate Science (Revised Syllabus) Ordinary Level paper for the examination in 2007 and subsequent years. These changes have been notified by circular to schools.

In addition, the details of Coursework B have been issued to schools in November 2006 in advance of the 2007 examinations to allow its completion at an earlier date and thereby not interfere with the final stages of preparation for the written examination.

2.5 Science (without & with Local Studies)

The results for candidates taking the Science without Local Studies examination are presented in Table 10 and Table 11. No candidates presented for Science with Local Studies at Higher Level. The results for candidates taking the Science with Local Studies examination at Ordinary Level are presented in Table 12.

Table 10 Breakdown of grades by gender for Science (without LS) – Ordinary Level

Science (without LS) (OL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Female	9.8	33.6	35.1	18.3	2.8	0.4	0.0	541
Male	7.6	31.5	35.9	18.9	4.6	1.3	0.2	1164
Overall	8.3	32.2	35.7	18.7	4.0	1.0	0.1	1705

Table 11 Breakdown of grades by gender for Science (without LS) – Higher Level

Science (without LS) (HL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Female	13.5	25.2	27.7	23.4	7.8	2.0	0.3	1475
Male	12.7	23.1	26.5	23.7	10.5	3.1	0.3	1617
Overall	13.1	24.1	27.1	23.6	9.2	2.6	0.3	3092

Table 12 Breakdown of grades by gender for Science (with LS)– Ordinary Level

Science (with LS) (OL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Female	0.0	33.3	33.3	33.3	0.0	0.0	0.0	3
Male	12.5	43.8	31.3	12.5	0.0	0.0	0.0	16
Overall	10.5	42.1	31.6	15.8	0.0	0.0	0.0	19

As indicated above the results for the candidates taking the Science (1989) syllabi showed a number of interesting features. The distribution of the cohort as between Higher Level and Ordinary Level saw 64% of this cohort taking Higher Level. This division is similar to that observed when these were the only syllabi available. The portion of the cohort taking Higher Level receiving grade C or better was 74.8% which is also similar to previous years. The rate of candidates receiving less than a grade D at Higher Level was 12.1% which was up on recent years. It was also observed that girls out-performed boys significantly.

In relation to Science (without Local Studies) the standard of candidate presenting at Higher Level appeared to be down slightly on recent years whilst the standard and distribution of grades achieved by candidates presenting at Ordinary Level seemed to be similar to those presenting in recent years. The standard of candidate presenting for the Science with Local Studies option seemed similar to previous years.

3 ANALYSIS OF CANDIDATE PERFORMANCE

3.1 SCIENCE (REVISED SYLLABUS)

3.1.1 Ordinary Level

The distribution of candidates receiving each grade presented in Table 13.

Table 13 Percentages of candidates receiving each grade at Ordinary Level

Science (Revised) (OL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Overall	1.1	24.2	46.8	21.7	4.1	1.8	0.2	14676

The distribution of these grades is discussed in Section 2 of this report.

The average mark obtained by candidates in each of the three components is given in Table 14.

Table 14 Average mark obtained for each examination component.

Science (Revised) (OL)	Component			Overall
	Coursework A	Coursework B	Written Paper	
Mark Available	60	150	390	600
Average Score	56	121	190	367
Percentage	93	81	49	61

Coursework

The marks awarded for Coursework A were high. This is not unexpected since it relates to the completion of coursework throughout the programme which is signed-off locally.

The high marks awarded for Coursework B is consistent with what is observed in other jurisdictions where coursework of this type is undertaken. Issues of authentication, plagiarism, the inappropriate use of material available from the Internet and other sources, and the receipt of outside assistance whether from teachers, parents or friends are of concern in relation to coursework. Such problems are not unique to Ireland and have been identified in other jurisdictions where coursework forms an element of assessment. Where the SEC is in any doubt about the authenticity of coursework the result is withheld while the matter is inquired into further with the school authorities.

At Ordinary Level a significant number of candidates (>200) from a small number of centres produced coursework reports which were very similar in nature. Marks for this coursework element were withheld initially and explanation sought from the schools in relation to observations made by the SEC. Parents, schools and teachers are reminded that the coursework presented and the reports thereof should be the work of the candidate only.

Written Paper

Statistical data relating to the attempting of questions and the marks awarded for questions for the Ordinary Level examination paper are given in Table 15.

Table 15 Statistical data on the answering of the Ordinary Level examination paper

Ordinary Level Science (Revised) examination – analysis of questions*						
Section	Question	Percentage of attempts	Marks allocated	Average Mark with (%)	Rank order in terms of %	Topic
A Biology	1	99.8	52	39(75)	1	Short items
	2	99.6	39	21(54)	4	
	3	99.4	39	14(36)	6	
B Chemistry	4	99.3	52	31(60)	2	Short items
	5	99.3	39	11(28)	9	
	6	99.2	39	13(33)	8	
C Physics	7	99.3	52	30(58)	3	Short items
	8	99.4	39	18(46)	5	
	9	95.7	39	14(36)	6	

* These statistics have been drawn from an analysis of approximately 7% of scripts which were selected at random.

With the exception of question 9, all other questions had an attempt rate of over 99%.

These statistics, however, do not reveal the reality that some parts of questions received low levels of response and in some cases a low award of marks.

Question by Question Commentary

While the overall standard of answering was good and, indeed, excellent at times, the comments offered here are aimed principally at highlighting some of the common errors made by candidates in answering the examination paper. They should be read in conjunction with the Ordinary Level examination paper.

Question 1 [Biology – short questions] **Average mark 39 (75%)** **Response 99.8%**

- (a) **Name** – good.
Use – good. Sometimes confused with apparatus used for testing for carbon dioxide.
- (b) **Names** – marks awarded here to all candidates.
Organ – good though some candidates offered “*skin*” as an answer.
- (c) **Name** – good, though some offered “*leaf*” as an answer.
Reason – good.
- (d) **Names** – good, though names sometimes reversed and also “*aorta*” confused with “*atrium*”.
- (e) **Names** – good, though names sometimes reversed.
- (f) **Identify** – good.
Mineral – candidates had difficulty in identifying the mineral required.
Many gave a source of the mineral.
- (g) **Names** – some offered “*cakes*” even though they were listed at the top of the pyramid.
Why? – good.
- (h) **Which?** – good.
What? – good.
Why? – candidates frequently confused the purpose of the oil with that in germination or rusting experiments i.e. to prevent oxygen getting in.

Overall comment: Though different candidates lost marks across all the elements of this question parts (f) and (h) were seen as the more discriminating elements.

Question 2 [Biology] **Average mark 21 (54%)** **Response 99.6%**

- (a) Poorly answered. Confusion between red and white cells was common.
- (b) (i) Poorly answered. Regularly confused with digestive system
(ii) Reasonably well answered. Most common mistake was to offer “*carbon dioxide*” instead of “*oxygen*”.
(iii) Reasonably well answered. Many gave a healthy activity such as “*running*” or “*cycling*”.
- (c) (i) Reasonably well answered. Sometimes confused with breathing system in part (b).
(ii) Poorly answered. Candidates often gave function of liver or left blank.
(iii) Very poorly answered. A reasonable number identified “*iodine*” as a reagent to test for starch and did not answer further.

Overall comment: Parts (a) and (c) of this question presented difficulty for many candidates. The text heavy nature of part (c) was identified by examiners as a likely source of difficulty.

Question 3 [Biology]

Average mark 14 (36%)

Response 99.4%

- (a) Poorly answered, seed B often identified as “*animal dispersed*”. “*Food*” often cited as a resource that seeds must compete for with the parent plant.
- (b) (i) Reasonably well answered. Usually only one condition stated.
(ii) Reasonably well answered. “*Water boiled to kill bacteria*” was the most common incorrect answer.
(iii) Good.
(iv) Very poorly answered. Many candidates had no concept of a fair test.
- (c) (i) Very poorly answered. Few had any idea what a “*decomposer*” is.
(ii) Very poorly answered. Many had no idea what “*biotechnology*” is.
(iii) Very poorly answered. Most of those who attempted this question observed soil under a microscope. Very many left the space blank.

Overall comment: Parts (a) and (b) were reasonably well answered. Part (b) exposed a weakness in understanding the concept of a fair test. This is disappointing given the emphasis on practical/investigative work in the delivery of the syllabus. Part (c) presented a problem observed in the assessment of the previous syllabus in that questions which involve describing an experiment or investigation are often not attempted.

Question 4 [Chemistry – short questions]

Average mark 31 (60%)

Response 99.3%

- (a) Well answered. A few candidates called the piece of apparatus “*a retort stand*”.
- (b) Well answered. “*Carbon dioxide*” was often cited as an element present in methane.
- (c) Well answered. “*Carbon*” was often cited as a compound.
- (d) **Which?** - well answered.
Function - poorly answered. Candidates often offered “*to prevent rusting*”.
- (e) Poorly answered. Many clearly had no idea of the charges on the particles.
- (f) **Element** - well answered.
Chemical - poorly answered. Many offered “*calcium chloride*”. This appeared to be taken from the previous page of the paper.
- (g) **Name** - poorly answered. Candidates often gave “*rubber*”.
Explain - well answered.
- (h) Well answered. There was some confusion between oxygen and carbon dioxide. Some candidates clearly did not know which gas supports combustion. “*Water*” was sometimes offered instead of “*limewater*”.

Overall comment: Though different candidates lost marks across all the elements of this question, part (e) was particularly poorly answered. The second part of many elements which probed a bit more understanding and depth also proved discriminating.

Question 5 [Chemistry] Average mark 11 (28%) Response 99.3%

- (a) (i) Well answered. “*Evaporation*” was often offered instead of “*distillation*”.
(ii) Well answered.
(iii) Poorly answered. Many candidates left blank. “*Cooling tube*” also offered.
(iv) Reasonably well answered. “*Funnelling*” was a common incorrect answer.
- (b) Very poorly answered. Most commonly left unanswered. Occasional candidates answered “*ionic*”, correctly, for sodium chloride.
- (c) Very poorly answered. Mostly blank. Electrolysis of water appears to be difficult for the candidates taking science at this level. Very few identified the gas and many gave the test for oxygen.
- (d) (i) Reasonably well answered. “*Pipette*”, “*tap funnel*”, or “*thermometer*” were common incorrect answers.
(ii) Reasonably well answered. “*Chloride salt*” or just “*salt*” were common incorrect answers.
(iii) Well answered, though guessing almost certainly contributed.
(iv) Reasonably well answered. Some reference to a “*colour change*” was commonly cited.

Overall comment: This was the lowest scoring question on the examination paper. Parts (b) and (c) were particularly poorly answered.

Question 6 [Chemistry] Average mark 17 (44%) Response 99.2%

- (a) Well answered. “*Oven cleaner*” was occasionally cited as an acid.
- (b) (i) Poorly answered. There was a very high degree of confusion between the preparation of oxygen and carbon dioxide. HCl and manganese dioxide were regularly given. There was confusion between manganese and magnesium.
(ii) Poorly answered. The word “*catalyst*” was not widely known or understood.
- (c) Poorly answered. Again there was confusion between the properties of oxygen and carbon dioxide. There was also a high level of misunderstanding in relation to the terms “*flammable*” and “*supports combustion*”.
- (d) Very poorly answered. The concepts of saturation or super-saturation did not seem to be familiar to many. Very few candidates were awarded more than 6 marks. Questions which demand a description were regularly unanswered or poorly answered.

Overall comment: This was the second lowest scoring question on the examination paper. Candidates seemed to have some familiarity with the gases but got them confused. Chemistry remains the most poorly answered section of the examination.

Question 7 [Physics – short questions] Average mark 30 (58%) Response 99.3%

- (a) Well answered. Most answered “ 24 cm^2 ” for the first part and then went on to contradict themselves in the second part.
- (b) Well answered.
- (c) Well answered. Most were able to identify the piece of apparatus but many gave “ 90 cm^3 ” as the volume.
- (d) Well answered. “*Solar*” often stated as the type of energy that generates lightning.
- (e) **Which?** - well answered.
Physical change - poorly answered. Given the array of answers offered it would appear that many candidates did not understand what was meant by a “*physical change*”.
- (f) The first part was well answered but the second part was poorly answered. The second part was often left blank.
- (g) Well answered.
- (h) The first part was poorly answered but the second part was well answered. The first part was usually attempted with a myriad of patterns being offered.

Overall comment: Though different candidates lost marks across all the elements of this question. Parts (e), (f) and (h) were particularly discriminating.

Question 8 [Physics] Average mark 18 (46%) Response 99.4%

- (a) (i) Reasonably well answered. Many candidates cited “*red*” rather than “*brown*” as the colour of the insulation on the live wire.
(ii) Reasonably well answered. Candidates regularly cited “*heat insulation*” rather than “*electrical insulation*”.
- (b) (i) Reasonably well answered. Some candidates gave “*dryer*” as the example.
(ii) Well answered.
(iii) Reasonably well answered. Many lost marks in the first part but knew how to perform the second part of the calculation.
- (c) (i) Reasonably well answered.
(ii) Reasonably well answered.
- (d) Reasonably well answered.

Overall comment: Candidates lost marks across all parts of this question.

Question 9 [Physics]**Average mark 14 (36%)****Response 95.7%**

- (a) (i) Reasonably well answered.
(ii) Reasonably well answered.
(iii) Reasonably well answered.

- (b) (i) Well answered.
(ii) Well answered.
(iii) Well answered.

- (c) (i) Very poorly answered.
(ii) Well answered.

Overall comment: The graph part of the question was answered well. Part (c) which involved the description of an experiment/investigation was not attempted by many candidates.

Ordinary Level – Coursework A and B

Marks obtained for coursework were generally high.

Coursework A. General comment: Good. The average mark obtained was 56 (93%)

Overall comment: The high return of marks here is not surprising. It is viewed as a support for the delivery of the syllabus through its intended activity-based approach. It is hoped that in addition to assisting in the development of laboratory and science investigative skills, this component will serve to support an appropriate teaching and learning environment for candidates.

Coursework B. General comment: Good. The average mark obtained was 121 (81%)

Overall comment: Again the high return of marks here is not entirely surprising. It is consistent with that observed for coursework in other jurisdictions. It is hoped that in addition to assisting in the development of laboratory and science investigative skills, this component will serve to support an appropriate teaching and learning environment for candidates. It should be noted that Coursework B had a common brief for Ordinary Level and Higher Level and that discrimination of standard between levels was achieved through the implementation of different marking schemes at each of the levels. The principle areas of weakness observed were in the areas of analysis, conclusions and comments. Issues pertaining to the authentication of the work are a cause for concern. C.f. Page 14 of this report.

3.1.2 Higher Level

The distribution of candidates receiving each grade is presented in Table 16.

Table 16 Percentages of candidates receiving each grade at Higher Level

Science (Revised Syllabus) (HL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Overall	10.2	31.6	38.8	17.9	1.2	0.2	0	30577

The distribution of these grades was discussed in Section 2 of this report.

The average mark obtained by candidates in each of the three components is given in Table 17.

Table 17 Average mark obtained for each examination component.

Science (Revised Syllabus) (HL)	Component			Overall
	Coursework A	Coursework B	Written Paper	
Mark Available	60	150	390	600
Average Score	59	128	213	400
Percentage	98	85	55	67

Coursework

The marks awarded for Coursework A were very high. This is not unexpected since it relates to the completion of coursework throughout the programme which is signed-off on locally.

The high marks awarded for Coursework B is consistent with what is observed in other jurisdictions where coursework of this type is undertaken. Issues of authentication, plagiarism, the inappropriate use of material available from the Internet and other sources, and the receipt of outside assistance whether from teachers, parents or friends are of concern in relation to coursework. Such problems are not unique to Ireland and have been identified in other jurisdictions where coursework forms an element of assessment. Where the SEC is in any doubt about the authenticity of coursework the result is withheld while the matter is inquired into further with the school authorities.

At Higher Level a number of candidates from a small number of centres produced coursework reports which were very similar in nature. Marks for this coursework element in these instances were withheld initially and explanation sought from the schools in relation to observations made by the SEC. Parents, schools and teachers are reminded that the coursework presented and the reports thereof should be the work of the candidate only.

Written Paper

Statistical data relating to the attempting of questions and the marks awarded for questions for the Higher Level examination paper are given in Table 18.

Table 18 Statistical data on the answering of the Higher Level examination paper

Higher Level Science (Revised Syllabus) examination – analysis of questions*						
Section	Question	Percentage of attempts	Marks allocated	Average Mark with (%)	Rank order in terms of %	Topic
A Biology	1	99.9	52	26(50)	5	Short items
	2	99.9	39	26(67)	2	
	3	100	39	29(74)	1	
B Chemistry	4	99.8	52	23(44)	8	Short items
	5	99.7	39	18(46)	6	
	6	99.6	39	17(44)	8	
C Physics	7	99.9	52	24(46)	6	Short items
	8	99.8	39	25(64)	3	
	9	95.5	39	25(64)	3	

* These statistics have been drawn from an analysis of approximately 7% of scripts which were selected at random.

With the exception of question 9 all other questions had an attempt rate of over 99%.

However, these statistics do not reveal the reality that some parts of questions received low levels of response and in some cases a low award of marks also. Other observations made from analysis of the reports from Assistant and Advising Examiners include the fact that the space allowed for answers seemed appropriate. Very few candidates needed to use the additional space at the end of the examination-booklet and when it was used it was for replacing cancelled answers.

The best answered part of the paper was the Biology section followed by the Physics section. The Chemistry section was the lowest scoring section of the examination paper with three of the four lowest scoring questions on the examination paper. It appears that Chemistry remains the area which presents most difficulty to candidates.

Question by Question Commentary

While the overall standard of answering was good and, indeed, excellent at times, the comments offered here are aimed principally at highlighting some of the common errors made by candidates in answering the examination paper. These comments should be read in conjunction with the Higher Level paper

Question 1 [Biology – short questions] Average mark 26 (50%) Response 99.9%

- (a) **Name** – good.
Type – fair, even though the joint was labelled “*elbow*”, “*ball & socket*” appeared on some scripts.
- (b) **Names** – well answered, “*micro-organisms*” and “*insects*” appeared in some cases.
- (c) **Name** – good.
Test – chemical named correctly in most cases, colour/s often incorrect.
- (d) **Describe** – most got 3 marks for “*limewater*”. Diagrams were often poor.
- (e) **What?** – good.
What? – confusion with menstruation common.
- (f) **Name** – good.
Name – “*protein*” appeared on many.
- (g) **How?** – good.
Advantage/Disadvantage – good.
- (h) **Result** – few candidates distinguished between covered and uncovered parts of the leaf in their answers. Many got 3 marks for ‘no starch/iodine stays yellow’
Conclusion – Reference to ‘light’ missing in many

Overall comment: Though different candidates lost marks across all the elements of this question, parts (c), (d), (e), (f) and (h) were seen as the more discriminating elements.

Question 2 [Biology] Average mark 26 (50%) Response 99.9%

- (a) (i) Good.
(ii) Weaker candidates gave answers such as: “*CO₂ swapped with O₂*”, “*O₂ inhaled CO₂ exhaled*”, “*O₂ changed to CO₂ in alveoli*”. The better candidates had no difficulty.
- (b) (i) Good.
(ii) Good.
(iii) Good.
- (c) (i) Good.
(ii) Good. Some candidates ‘counted’ beats but did not mention time.
(iii) Some candidates simply rephrased the question giving no reasons for the changes in pulse rate e.g. exercise: ‘*more blood being pumped*’, rest: ‘*less blood being pumped*’ with no mention of why? Some calculated the difference in pulse rate between exercise and rest.

Overall comment: Parts (a) (ii) and (c) (ii) and (iii) were the more discriminating elements of this question

Question 3 [Biology] Average mark 29 (74%) Response 100%

- (a) (i) Good. Many weaker candidates cited “energy” as a nutrient
(ii) Good.
(iii) Good.
- (b) (i) Good. Some candidates named the parts A and B.
(ii) Good.
(iii) Good. Some candidates gave a diagram of a microscope & the preparation of a microscope slide.

Overall comment: This was the highest scoring question on the examination paper. It would appear that many candidates had made a microscope slide from plant tissue. This is seen as positive and the question clearly rewarded those who had engaged in practical activity.

Question 4 [Chemistry – short questions] Average mark 23 (44%) Response 99.8%

- (a) Poorly answered. Definition not learned by many. Some references to “isobars”
- (b) **Names** – only fair. Many only named one chemical. Some confusion with preparation of CO₂. “Magnesium” given for “manganese”.
- (c) **Name** – fair/good. “Sulfuric acid” common.
Effect – good.
- (d) Good generally. Some candidates gave “boil” or “heat” only.
- (e) **State** – good.
Order – only the better candidates got the order correct.
- (f) Good.
- (g) Poor. “CaCO₂” given by some.
- (h) **Why?** – fair/poor. “Catalyst” appeared on some scripts.
Test – fair. “Relights glowing splint” or “extinguishes a burning splint” were given by some.
What? – good generally. In instances where the answer was incorrect various references to O₂/H₂/CO₂, or “more of gas A/H₂” suggested that guessing was involved.

Overall comment: This was the one of the two lowest scoring question on the examination paper. Many marks were lost in this question due to the basic absence of knowledge and understanding. Parts (a), (e), (g) and (h) were particularly discriminating.

Question 5 [Chemistry]**Average mark 18 (46%)****Response 99.7%**

- (a) (i) Good. “*Tap funnel*” appeared in some booklets suggesting that they had perhaps not carried out a titration. Some candidates named the chemicals in A and B.
(ii) Poor. Many assumed 25 cm³ of acid was required. Only the better candidates described how to use the burette.
(iii) Fair. Many candidates gave the formula/name of only one chemical.
(iv) Fair/Poor. Only the better candidates got 6 marks. Some gave only one reactant or product.
- (b) Good.
- (c) (i) Good.
(ii) Good. Some answered “*nothing happens*”.
- (d) Good. Some simply repeated parts of the question in their answers.

Overall comment: This was also a low scoring question. A lack of familiarity with the preparation of a sample of salt was the biggest source of mark loss in this question. This would suggest that a significant number of candidates did not carry out this experiment/investigation.

Question 6 [Chemistry]**Average mark 17 (44%)****Response 99.6%**

- (a) (i) Fair. “*You might get burned*” was given by some.
(ii) Poor. Often left blank.
(iii) Poor. “*Oxygen/carbon dioxide/hydrogen/...*” Only the better candidates gave “*nitrogen*”.
(iv) Poor. Often not attempted. “*Gases dissolve in water*”, “*candle went out*”.
- (b) (i) Good.
(ii) Good. Some named alkali metals.
- (c) **Give** – good.
(i) Good. Some omitted calcium chloride/drying agent
(ii) Good. Some omitted boiled water...

Overall comment: This was one of the two lowest scoring questions. Many candidates found it difficult to draw on knowledge from a number of sources, and to compare these experiments.

Question 7 [Physics – short questions] Average mark 24 (46%) Response 99.9%

- (a) Poorly answered. Mass was often confused with volume; “*amount of space*”. Weight was described as “*how heavy*” by some.
- (b) Good.
- (c) Answered very well by the better candidates. Less able candidates made incorrect attempts or made no attempt at all.
- (d) **What?** – good.
Example – some confusion with reflection. Some candidates gave answers like “*spoon in water*” with no reference to it appearing to be bent.
- (e) **Definition** – good/fair. Some weaker candidates gave “*amount of heat*” for Temperature.
Unit – good. “*Degrees*” alone appeared in some booklets.
- (f) Good/fair. Most candidates got at least 3 marks for melts/breaks/blows...
- (g) **Name** – good.
Difference – Less able candidates did not get marks here.
- (h) Answering was good by candidates who had knowledge and understanding of LEDs and a.c. Many candidates, however, showed lack of understanding.
Observations – many had LED in A “*off*” and LED in B “*on*”. Some gave “*forward/reverse bias*” in different combinations for A and B.
Explanation – poor in general. Answers included: “*not enough power*”, “*weak battery*”.

Overall comment: This was one of the least well answered questions of the physics section. Parts (a), (c), (g) and (h) were particularly discriminating.

Question 8 [Physics] Average mark 25 (64%) Response 99.9%

- (a) (i) Good.
(ii) Good.
- (b) Good.
- (c) (i) Fair. “*Melting*”, “*solid to liquid*”, “*stays at same temperature*” “*change of state*” appeared in some booklets.
(ii) Only the better candidates gave a correct answer.
- (d) (i) Good. “*Hole in (damage to) ozone layer*”, “*air pollution*”, “*smog*” “*damages environment*” given by some candidates.
(ii) Good. “*Water*” alone given by some.

Overall comment: This was one of the better answered questions on the examination paper. The ability of a large number of candidates to apply their knowledge in part (a) was encouraging. Parts (c), and (d) and, to a lesser extent, (c) were discriminating.

3.2 Science with and without Local Studies

3.2.1 Ordinary Level

The distribution of candidates receiving each grade presented in Table 19 and 20.

Table 19 Percentages of candidates receiving each grade at Ordinary Level in Science (without Local Studies)

Science (without Local Studies)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Overall	8.3	32.2	35.7	18.7	4.0	1.0	0.1	1705

Table 20 Percentages of candidates receiving each grade at Ordinary Level in Science (with Local Studies)

Science (with Local Studies)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Overall	10.5	42.1	31.6	15.8	0.0	0.0	0.0	19

The standard observed by examiners and the results for examinations of the 1989 syllabi were in keeping with those for previous years. The size of the cohort taking Science (with Local Studies) is so small that it would be inappropriate to draw any conclusions from the statistics.

In general, different parts of most questions proved difficult for different candidates. This would seem to reflect “patchy” knowledge rather than specific areas of difficulty. However, a number of specific parts of questions are worthy of comment.

In Section A, parts (f), (g), (j) and (n) of Question 1 were poorly answered.

In Section B, Question 2 part (c) – which was an open-ended question – was left unanswered by most candidates. Any attempts encountered were generally poor. All parts of Question 3 were attempted by most candidates. In Question 4, part (c) was an open-ended question and it was not attempted by nearly 70% of candidates. However, in this instance a significant number of those who did answer the question made a reasonable attempt at it. In Section B, Question 5 was attempted in full by most candidates though part (c) was the most poorly answered part. In Question 6, part (c), which was an open-ended element, was almost completely ignored. Question 7 part (c) was attempted infrequently, even though the question was structured.

In Section C, Question 8 was well answered by many candidates. In Question 9, part (a) was well answered, part (b) was attempted but not well answered, and part (c) which was open-ended was largely left unanswered. Question 10 part (a) proved difficult even though the answers were supplied. The other parts of Question 10 were answered more successfully.

In Section E most questions, apart from Question 12 (Horticulture), had a reasonable number of attempts. Parts of Question 11 seem to be answered by use of general knowledge. Question 13 on materials, Question 14 on food and Question 16 on energy conversions were also popular and at least well answered in part.

The most striking observations in relation to this examination were the reluctance of candidates to answer open-ended questions and their tendency to answer many extra questions. The latter practice served to optimise their use of the wide choice in the examination to maximise their mark.

Coursework / Projects associated with Local Studies

Only 19 Ordinary Level candidates presented and the standard observed seemed in keeping with that of previous years.

3.2.2 Higher Level

The distribution of candidates receiving each grade is presented in Table 21.

Table 21 Percentages of candidates receiving each grade at Higher Level in Science (without Local Studies)

Science (Revised Syllabus) (HL)	Grade							Total Candidature
	A	B	C	D	E	F	NG	
Overall	13.1	24.1	27.1	23.6	9.2	2.6	0.3	3092

The overall standard of candidates seemed slightly lower than in previous years and there was a higher proportion of less able candidates.

No candidates presented for the Local Studies option at Higher Level.

As has been the case for many years, the Food and Materials options in the Applied Science Section were most popular with very few candidates attempting questions on Horticulture or Electronics.

Within the main body of the examination (i.e. Sections A to D) a few specific comments are made.

In Section A Question 1 parts (d), very few candidates converted to kW. The concept of latent heat required in part (g) was unknown to most candidates, and in part (j) many candidates did well to identify one colour. In Question 2, familiarity with electrolytes, isotopes and crystals in parts (c), (g) and (h) were lacking. In Question 3, part (j) relating to alveoli was poorly answered.

In Section B, Question 4 was slightly less popular than Question 5. In Question 4, many candidates did not convert 2.5 kg to newtons. In Question 5, distinguishing between a.c. and d.c. posed the greatest difficulty.

In Section C, there was a good balance between the attempt rates of both questions. In Question 6, magnesium was often offered in place of manganese. In Question 7 part (a), many gave the name of substances but omitted to mention burning in relation to a reaction which gave out heat. Part (b) was poorly answered.

In Section D, Question 8 was significantly less popular than Question 9. In Question 8, part (b) was particularly poorly answered. Assimilation was regularly confused with absorption. The name of the enzyme was not known by many and few could identify the end product. Question 9 was well answered but the word “fusion” was conspicuously absent from answers in the part of the question relating to fertilisation. In Section D Questions 12 and 13 were by far the most popular and well answered. These were followed by Question 10. A small number of candidates answered Question 15 and attempts at Questions 11 and 14 were rare.

In general, candidates score well Section E - the Applied Science Section of the paper.

As has always been the case, candidates tended to score well in Section A and Section E – availing of the high degree of choice in these sections. Sections B, C and D tend to be the sections which offered some discrimination between candidates. A significant number of candidates (c. 20%) attempted a second question in each section.

4. CONCLUSIONS

4.1 Ordinary Level (Revised Syllabus)

- The Ordinary Level examination paper was well received by candidates, teachers, examiners, and by teachers' organisations. It was considered a fair but testing assessment of candidates' ability in Science and reflected the change in emphasis of the course. The use of diagrams and stimulus material was welcomed.

- 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. Space provided on the paper to complete answers was found to be adequate and very few candidates needed to avail of the extra space provided at the back of the answer-booklet.

- The results for Ordinary Level show a number of changes on the results for previous years at this level:
 - The A rate at 1.1% has dropped significantly on the A rates for previous years

 - The combined ABC rate of 72.1% is reasonably close to the combined ABC rate for previous years.

 - The combined EFNG rate of 6.2% is significantly higher than the combined EFNG rate for previous years and is to be regarded as being somewhat disappointing.

- Various factors were cited as contributing to the lower incidence of higher grades, and the lower A grade in particular. These included the following:
 - the change in the distribution of the overall cohort with a higher proportion of candidates taking the Higher Level examination

 - the increased incidence of questions which assessed higher order skills

 - the absence of choice on the paper

 - the presence of more "open-ended", "describe an experiment/ investigation....", type questions

 - the lower incidence of "multiple choice" type questions.

- For the most part those candidates who received E, F and NG grades fell into two groups: those who did not submit coursework, and/or candidates who fell well-short on the knowledge, detail and accuracy required to reach a grade D. Both categories are a cause for concern.
- Some of those candidates who achieved a grade D did so principally on the basis of their coursework mark and scored poorly in the written examination.
- Knowledge of simple facts, and information was frequently poor. However, even more able candidates often lost marks for not knowing very basic information.
- Candidates engaged reasonably well with most items on the paper but experienced difficulty with more open-ended questions.
- Many candidates engaged with the higher-order questions but these items proved somewhat more challenging. The fact that such items could not be avoided increased the demand of the test on candidates. The absence of choice, however, may improve the quality of learning as the revised syllabus becomes established.
- In general, teachers and candidates welcomed the coursework elements of the revised syllabus. Most candidates presented procedure and recorded data well. Identification of variables and controls, however, were sometimes less than what was required.
- Coursework presented by a numbers of candidates was very similar. A number of candidates wrote identical or very similar entries for analysis, conclusion and comment, or simply left these sections blank. Consequently, these sections were often the weaker parts of the report. Parents, schools and teachers are reminded that the coursework presented and the reports thereof should be the work of the candidate only.

- Assistant Examiners found that some self-nominated investigations presented for Coursework B were too short in terms of what was undertaken, presented insufficient detail under the prescribed headings, and lacked scientific basis, data, results or conclusions.

4.2 Higher Level (Revised Syllabus)

- The examination paper at Higher Level was well received by candidates, teachers, examiners, and by teachers' organisations. It was considered a fair test of candidates' ability in Science at this level and reflected the change in emphasis of the syllabus. The use of diagrams and stimulus material was welcomed.
- Candidates followed the instructions on the examination paper correctly and attempted to answer the questions being asked.
- In the vast majority of cases the manner in which candidates presented material was satisfactory. Space provided on the paper to complete answers was found to be adequate and very few candidates needed to avail of the extra space provided at the back of the answer-booklet.
- The results for Higher Level show a number of changes on the results for previous years at this level:
 - The A rate shows a decrease of 4% from 14.5% in 2005 to 10.5% in 2006
 - The combined ABC rate has increased significantly from 71.2% in 2005 to 79.1% in 2006 and is the highest ABC rate in the last four years
 - The EFNG rate has dropped from 6.9% in 2005 to 2.5% in 2006 and is the lowest rate in the last four years.
- Overall, the results achieved at Higher Level – particularly the significantly higher ABC rate and the equally significant lower EGNG rate – have to be read as a very positive outcome to the Revised Junior Science examination at this level.
- The introduction of coursework elements in the revised science course, in which candidates ordinarily tend to score more freely, would appear to have contributed significantly to the changed grade profile at Higher Level.

- A combination of factors was identified as contributing to the lower incidence of A grades. The change in the distribution of the overall cohort which saw a higher proportion of candidates taking the Higher Level examination was suggested as one of these factors. The written examination paper containing more questions which assessed higher order skills and the absence of choice within the paper were also cited as contributory factors.
- Candidates who received E, F and NG grades generally fell into two categories: those who did not submit coursework, and candidates who fell well-short on the knowledge, detail and accuracy required to reach a grade D. Both categories are a cause for concern.
- Some candidates who achieved a grade D did so principally on the basis of their coursework mark and scored poorly in the written examination.
- Knowledge of simple facts, and information was generally good. However, some candidates lost marks for not knowing very basic very information.
- Candidates engaged well with the higher-order questions though, as anticipated, these items frequently proved more demanding for candidates. The fact that such items could not be avoided increased the demand of the test on candidates. The absence of choice, however, may improve the quality of learning as the revised syllabus becomes established.
- Candidates appeared to enjoy doing the coursework element of the assessment and learned a lot from the experience. This was clearly evident from the work in their booklets. In their reports most candidates presented procedures and recorded data excellently. Identification of variables and controls, however, were sometimes less than what was required.
- Some candidates wrote identical or very similar entries for analysis, conclusion and comment. These sections were frequently the weaker parts of the report. The presentation of similar coursework by numbers of candidates is a cause of concern.
- Assistant Examiners found that some self-nominated investigations in coursework too short in terms of what was undertaken, presented insufficient detail under the prescribed headings, and lacked scientific basis, data, results or conclusions.

4.3 Ordinary Level (with & without Local Studies)

- The Ordinary Level examination paper was well received by candidates, teachers, examiners, and by teachers' organisations. It was considered a fair but testing assessment of candidates' ability in Science at this level. The use of diagrams and stimulus material was welcomed.
- 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. Space provided on the paper to complete answers was found to be adequate and very few candidates needed to avail of the extra space provided at the back of the answer-booklet.
- The results for Ordinary Level were largely in keeping with the results for previous years.
- Knowledge of simple facts, and information was frequently "patchy".
- Candidates engaged reasonably well with most items on the paper but experienced difficulty with, and more often than not simply declined to engage with the more open-ended questions.

4.4 Higher Level (without Local Studies)

- The examination paper at Higher Level was well received by candidates, teachers, examiners, and by teachers' organisations. It was considered a fair test of candidates' ability in Science at this level. The use of diagrams and stimulus material was welcomed.
- Candidates followed the instructions on the examination paper correctly and attempted to answer the questions being asked.
- In the vast majority of cases the manner in which candidates presented material was satisfactory. Space provided in Section A of the paper to complete answers was found to be adequate.

- The results for Higher Level were slightly down on the results for previous years – principally due to an increase in the proportion of less able candidates presenting themselves for the examination.
- The observation that candidates scored reasonably freely in Section A and in Section E was again in evidence. Interestingly, this year it was the Physics section of the examination which was the most discriminating of the three subject specific sections. Historically it was the Chemistry section which tended to prove most demanding.
- Many of the candidates who received E, F and NG grades would have been well advised to have presented at Ordinary Level as their knowledge and understanding fell well short of the standard required at Higher Level.

5. RECOMMENDATIONS TO TEACHERS AND STUDENTS

- Completion of both Coursework A and Coursework B by candidates is of paramount importance. Some candidates will find it virtually impossible to achieve a Grade D if they do not present coursework. It should be remembered that the combined coursework elements comprise 35% of the marks available for assessment.
- Candidates should adhere to the guidelines and obey the regulations relating to the completion and submission of coursework.
- Parents, schools and teachers are reminded that the coursework presented and the reports thereof should be the work of the candidate only and that marks may be withheld if it is deemed that inappropriate assistance has been given to candidates.
- Course completion is essential as preparation for the examination. Examinations with no choice do not lend themselves to successful “corner cutting” of the course.
- Science is a rigorous area of study and demands accuracy of language. Candidates should be encouraged to try to be clear in what they write. The inclusion of labelled diagrams to support descriptions should be encouraged.
- Where questions require the description of an investigation or experiment candidates should use the “equipment”, “procedure”, “results”, “conclusions” type headings, which they have become familiar with through the coursework A & B, as a guide to answering.
- Ordinary Level candidates and their teachers should pay attention to Circular S34/07 and the accompanying Exemplar Material issued by the SEC in March 2007. This circular relates to changes in the Ordinary Level examination paper for 2007 and subsequent years.
- Candidates and teachers who remain engaged with the 1989 syllabi are reminded that there will be no change in the standard of the examination between now and its final sitting in 2008. Past examination papers remain the best indicators of question structure and standard.