Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE 2008

MARKING SCHEME

SCIENCE (REVISED)

ORDINARY LEVEL

TABLE FOR ASSIGNING GRADES	
GRADE	**RANGE**
A	510 - 600
B	420 - 509
C	330 - 419
D	240 - 329
E	150 - 239
F	60 - 149
NG	0 - 59

GUIDELINES TO EXAMINERS

General Points regarding the Marking Scheme for Junior Certificate Science

1. In many cases only key phrases are given in the marking schemes. These points contain the information and ideas that must appear in the candidate's answer in order to merit the assigned marks.

2. The descriptions, methods and definitions given in a marking scheme are not exhaustive and alternative valid answers are acceptable.

3. The detail required in any answer is determined by the context and the manner in which the question is asked and by the number of marks assigned to the answer in the examination paper. This may vary from year to year.

4. The word(s) / phrase(s) used in the scheme indicate the essential points required in the candidate's answer. A double solidus (//) separates points for which separate marks are allocated in a part of the question. Words, expressions or statements separated by a solidus (/) are alternatives which are equally acceptable for a particular point. A word or phrase given in brackets is an acceptable alternative to the preceding word or phrase. Note, however, that words, expressions or phrases must be correctly used in context and not contradicted. Where there is evidence of incorrect use or contradiction, the marks may not be awarded.

5. In general, names and formulas of elements and compounds are equally acceptable except in cases where either the name or the formula is specifically asked for in the question. However, in some cases where the name is asked for, the formula may be accepted as an alternative. This is clarified within the scheme.

6. There is a deduction of one mark for each arithmetical slip made by a candidate in a calculation. If the incorrect calculated value is used in a subsequent calculation 'correctly' allow the marks for the subsequent calculation.

7. Cancelled & / or Repeated Answers

(a) In the case of short-answer questions, if an answer is cancelled and a second answer given, the cancellation is accepted and marks are awarded for the uncancelled answer.

(b) If two answers are given and neither answer is cancelled, the first answer offered only is accepted and marked accordingly.

(c) If the only answer offered is cancelled, the cancelling is ignored and the answer marked as normal. However, in MCQ-type questions cancelling of an incorrect and correct answer applies.

For answers to "describe an investigation / an experiment", multiple attempts will be dealt with as follows:
If a candidate answers a question or part of a question once only and then cancels, the cancelling is ignored and the answer marked as normal. If a candidate answers a question or part of a question more than once and then cancels one attempt, the cancelling will be ignored and all the answers, whether cancelled or not, marked as normal. However, only the marks gained in respect to the highest scoring attempt will be counted. Points cannot be "mixed and matched from two attempts". The disallowed marks should be enclosed in square brackets.

8. Deduction of marks for omitted labelled diagrams

Assign marks in the usual way. Then use square brackets to deduct the marks.

9. Application of the marking scheme

Apply the marking scheme as agreed.
Assistant Examiners should enter marks in Examiner use only Column 1.
Advising Examiners should use Column 1.
Column 2 to be used by Appeal Examiners.
Disallowed marks should be placed in square brackets i.e. '[ ]'.

10. Transfer of marks

All marks should be transferred to the grid on the cover page of the examination answer-booklet.
Marks should be totalled, the bonus for answering through Irish applied where relevant.

Junior Certificate Examination

SCIENCE

Ordinary Level Paper

WRITTEN EXAMINATION PAPER

Three Sections: Biology, Chemistry and Physics, *all* questions to be answered by candidates.

Biology Question 1 (52 marks); Question 2 (39 marks); Question 3 (39 marks)
Chemistry Question 4 (52 marks); Question 5 (39 marks); Question 6 (39 marks)
Physics Question 7 (52 marks); Question 8 (39 marks); Question 9 (39 marks)

COURSEWORK A

Count the number of ticked (✓) mandatory biology investigations/experiments claimed on page 5. Note this number in the box on page 5 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of ticked (✓) mandatory chemistry investigations/experiments claimed on page 6. Note this number in the box on page 6 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of ticked mandatory (✓) physics investigations/experiments claimed on page 7. Note this number in the box on page 7 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Total the number of investigations / experiments claimed and award 2 marks per investigation/experiment to an amount not exceeding maximum 60 marks.

COURSEWORK B

Mark the SEC nominated investigations according to the agreed criteria. Enter the marks for each section in the Coursework B grid on the cover page of the coursework booklet.

or

Mark the candidate nominated investigation according to the agreed criteria. Enter the marks for each section in the Coursework B grid on the cover page of the coursework booklet.

COURSEWORK A & B

Transfer total marks awarded for Coursework A and Coursework B to grid on the cover page of the examination answer-booklet.

SCIENCE (REVISED SYLLABUS) ORDINARY LEVEL 2008
Summary of Marking Scheme

BIOLOGY

Question 1		(7 × 6 + 1 × 10)
Question 2	(a)	(6 + 3), (3)
	(b)	(1 × 6), (3 × 3)
	(c)	(4 × 3)
Question 3	(a)	(4 × 3)
	(b)	(6 + 3)
	(c)	(2 × 3)
	(d)	(4 × 3)

CHEMISTRY

Question 4		(7 × 6 + 1 × 10)
Question 5	(a)	(4 × 3)
	(b)	(2 × 6 + 3)
	(c)	(4 × 3)
Question 6	(a)	(4 × 3)
	(b)	(6 + 3)
	(c)	(2 × 3)
	(d)	(4 × 3)

PHYSICS

Question 7		(7 × 6 + 1 × 10)
Question 8	(a)	(6 × 3)
	(b)	(3 × 3)
	(c)	(4 × 3)
Question 9	(a)	(2 × 3)
	(b)	(1 × 6), (2 × 3)
	(c)	(6 × 2), (6), (3)

BIOLOGY

Question 1

(a) Quadrat (3)

Estimating (counting / studying) plant (named plant) //
estimating (counting / studying) sedentary animal (named animal) //
habitat study (3)

(b) **A** (3)
P (3)

A
P

(c) **T**: Muscle [IV **F**: Matán] (3)
O: Heart (3)

T

O

F

O

(d) **X**: Flower / petal (3)
Y: Stem / stalk /shoot (3)

(e) **A**: Strawberry (3)
W: Dandelion [IV **G**: Caisearbhán] (3)

A W

A G

(f) **1**: Oxygen / O_2 (3)
2: Carbon dioxide / CO_2 (3)

(g) **A**: Kidney (3)
B: Store (hold / release) urine (3)

(h) **A** (3)

A (3)

More fat / more protein / less carbohydrate / more energy (4)

Question 2

(a) **P**: Bladder
S: Brain
R: Lungs

R
S
P

[IV **P**: Lamhnán]
[IV **C**: Inchinn]
[IV **E**: Scamhóga]

E
C
P

*(**1 × 6 + 3**)

Support / movement / production of blood cells / shape (3)

(b) **B**: Retina
A: Lens
D: Allows light in
C: Focus light

B
A
D
C

*(**1 × 6**) + (**3 × 3**)

(c) (i) **S**: Benedict's / Fehlings

S
S

[IV **T**: Benedict / Fehling]

either or both

T
T

(3)

(ii) **R**: Glucose

R

[IV **D**: Glúcós]

D
---

(3)

(iii) **B**: Blue
E: Brick red

B
E

[IV **T**: Gorm]

T
E

(3)
(3)

Question 3

(a) **C**: Lens
A: Eyepiece / Lens
B: Focus wheel
F: Focus

C/A

A
B

F

(4 × 3)

(b) **Accept any two:**

A: Spider
C: Wasp
D: Caterpillar

A
C

C/D

*(**6 + 3**)
any two - cancelling does not apply here

(c) Leaf (3)

Iodine (3)

(d) **State or show (4 × 3)**

Seedling / leafy plant / named flower or plant

Place in coloured water

Leave for a time

Seedling (leafy plant / flower) becomes coloured or other valid result

[Marks awarded in context of valid experiment.
No diagram deduct 3 marks – diagram must include at least one label]

CHEMISTRY

Question 4

(a) Tripod (3)
To hold (support) objects (when heating) (3)

(b) **S** / sulphur (3)
N / nitrogen (3)

(c) **M**: Can be stretched / Shiny (2 × 3)
cancelling only applies where 3 Ms are entered

M
M

(d) Vinegar (3)
Oven cleaner (3)

(e) Basic / Alkaline *(**6**)

(f) **R**: Screening [IV **B**: Scagadh] (3)
T: Fluoridation [IV **C**: Fluairídiú] (3)

T

R

B

C

(g) **Any two of**:
Carbon dioxide / nitrogen / water (vapour / steam) / helium / (named noble gas) / ozone (2 × 3)

(h) All requirements present / had oxygen (air) and moisture (3)

No oxygen (air) (3)

Galvanising / painting (varnishing)/ oiling (greasing) / plastic coating / electroplating / alloying (4)

Question 5

(a) Neutron (3)
Proton (3)
Electron (3)
Proton / neutron (3)

(b) Fair test / all the same

Soft (water) / not hard (water)

Calcium (Ca) / magnesium (Mg) / iron (Fe) *(**2 × 6 + 3**)

(c) **A**: Burette (3)

Salt: Sodium chloride (NaCl) (3)

A / burette (3)

Colour change observed (mentioned) (3)

Question 6

(a) Coal, Oil (2 × 3)

Any two of:
Carbon dioxide (CO_2) / water (steam) (H_2O)/ sulphur dioxide (SO_2) (2 × 3)
[Allow: carbon monoxide (CO) and NO_x gases]

(b) Acetone / water / (named) alcohol / named suitable solvent

Chromatography *(**6 + 3**)

(c) Distillation (3)

Salt and water (3)
[Accept: alcohol and water]

(d) **State or show (4 × 3)**

FILTRATION	**DECANTING**	**EVAPORATION / DISTILLATION**
Filter paper	Mixture in container	Mixture in container
Pour Mixture	Settle / stand	Heat
Water drips through	Pour / decant	Evaporate / boil off
Soil remains	Soil remains	Soil remains

[Marks awarded in context of valid experiment.
No diagram deduct 3 marks – diagram must include at least one label]

PHYSICS

Question 7

(a) Thermometer (3)
Measuring (take / read) temperature (how hot) (3)

(b) Reflected ray at correct angle (3)
Reflection (3)

(c) **R**: **Any two of**:
Wind / solar / wave (2 × 3)

(d) Mass / Volume (3)
2 (20 /10) (3)

(e) **C**: Ampere --- C E [IV **L**: Cileavatuair] --- C L (3)
E: Kilowatt hour (3)

(f) **A**: Prism (3)
B: Green (3)

(g) (Flash of) lightning (3)
Light is (travels) faster (than sound) (3)

(h) Water rises up the tube [Allow: water (liquid) expands] (3)

Water (liquid) expands (when heated) (3)

Easier to see (4)

Question 8

(a) (i)

A:	Switch	D	(3)
B:	Power supply	B	(3)
C:	Resistor	C	(3)
D:	Bulb / lamp	A	(3)

(ii) Metal (3)
Metal is a conductor / wood is an insulator (3)

(b)

X:	Earth	Y	(3)
Y:	Live	---	(3)
Z:	Safety	X	(3)

		Z	

(c) **State or show (4 × 3)**

Magnet

Sheet of paper correctly used

Iron filings / compasses

Shake (tap) / Pattern of filings around magnet / join dots

[Marks awarded in context of valid experiment.
No diagram deduct 3 marks – diagram must include at least one label]

Question 9

B

B

B

(a) **Any two of**:

B: Electrical to light / electrical to heat / heat to light (2 × 3)

(b) C

A

Longer lever / longer distance (further) from fulcrum *(**6 + 2 × 3**)

(c) (i) Correct line on its own

5 points correctly plotted and join plotted points (12)

Award 2 marks for each correct point plotted

Award 2 marks for joining plotted points

(ii) 25 ± 2 (6)

(iii) 5 ± 0.2 (correct fraction) (3)
[Award marks for correctly calculated speed if done from their own incorrectly drawn graph.]

BIOLOGY – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	Investigate the effectiveness of using commercial flower preservative compared with two other (food) household substances	**O.L.**
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	**Statement / identification of problem / topic to be investigated:** **Research:** Any reference to book / internet (web) / person consulted etc.	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls :** Identify any ***three*** variables and/or indicate how some of these need to be controlled or held fixed: type of plant food or household substances (named household substances) / type of flower (same / named flower) / time for flower to die / flowers to be cut at same time / stem length / number of flowers per container / mass of preservative / volume of water used / identical containers / place in similar environment (light or/and temperature)	(4 + 3 + 3)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***three*** pieces of equipment used: Flowers / water / containers / commercial plant food and other plant foods (household substances) / pestle & mortar / scissors (scalpel) / labels / measuring cylinder / balance (scales)	(2 + 2 + 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify any ***three*** tasks carried out in investigation: get flowers / cut flowers (at an angle or length) / make up feed solutions / put flowers in feed solutions / label containers / monitor / record data / graph	(2 + 2 + 1)

Procedure	Procedure, apparatus, safety, data collection/observations ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations	20	**Safety:** Identify any ***two* specific** safety precautions followed in conducting the investigation **Procedure:** State <u>or</u> Show Identify any ***five*** steps taken in conducting investigation: get flowers / cut stems of flowers to same length / cut stems at an angle / measure length of flowers / mass of plant food / measure volume of water / make up feed solutions / label containers / put flowers in feed solutions / place in same environment / monitor / record data / graph / repeat **Recorded Data / Observations:** Identify any ***two*** points related to method used: **life** of flowers for // different **foods** [Table presentation likely]	(3 + 2) (3 + 3 + 2 + 1 + 1) (3 + 2)
Analysis & Conclusions	Analysis ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s)	20	**Calculations / Data analysis:** ***One*** relevant comment analysing data **or** calculation **or** graph Limited manipulation of data **OR** Good manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **or** evaluation of results obtained Limited treatment **OR** Good treatment	 (7) (10) (7) (10)
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	***One*** comment on **refinement / extension / source of error**: reliability of data / how process could be improved / sources of error / possible reason for unexpected result / possible extension of investigation Limited comprehension **OR** Good comprehension	 (7) (10)

CHEMISTRY – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	Investigate how particle size affects the speed of loss in mass from the reaction of marble chips and dilute HCl	**O.L.**
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	**Statement / identification of problem / topic to be investigated:** **Research:** Any reference to book / internet (web) / person consulted etc	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls :** Identify any ***three*** variables and/or indicate how some of these need to be controlled or held fixed: particle size (size of chips) / fixed mass of chips / volume of HCl / conc. of HCl / change in mass (of apparatus) / same reaction vessel / time taken for mass to change / same temperature (conditions) / same amount of cotton wool / same balance	(4 + 3 + 3)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***three*** pieces of equipment used: reaction flask / balance / weigh boat (filter paper) / cotton wool / marble chips / pestle and mortar / sieve / HCl solution / measuring cylinder / Safety glasses / gloves / stopclock (watch)	(2 + 2 + 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify any ***three*** tasks carried out in investigation: sort marble chips by size / weigh marble chips / measure acid / react marble chips with acid / measure mass loss / record data / graph	(2 + 2 + 1)

Procedure	Procedure, apparatus, safety, data collection/observations ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations	20	**Safety:** Identify any ***two* specific** safety precautions followed in conducting the investigation **Procedure:** State <u>or</u> Show Identify any ***five*** steps taken in conducting investigation: how chips were sorted / equal mass of different chips / acid was measured / how to start reaction / plug vessel with cotton wool / how to measure mass loss (mass recorded at timed intervals) / record data / repeating for different sized chips / repeat to get averages / graph results **Recorded Data / Observations:** Identify any ***two*** points related to method used: indication of **sized chips** and **mass loss in specified time** / [Table presentation likely]	(3 + 2) (3 +3 + 2 + 1 + 1) (3 + 2)
Analysis & Conclusions	Analysis ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s)	20	**Calculations / Data analysis:** ***One*** relevant comment analysing data **or** calculation **or** graph Limited manipulation of data **OR** Good manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **or** evaluation of results obtained Limited treatment **OR** Good treatment	 (7) (10) (7) (10)
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	***One*** comment on **refinement / extension / source of error** e.g. Reliability of data / how process could be improved / sources of error / possible reason for unexpected result / possible extension of the investigation Limited comprehension **OR** Good comprehension	 (7) (10)

PHYSICS – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	Investigate the thermal insulation properties of 3 fabrics including denim when dry and wet	**O.L.**
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	**Statement / identification of problem / topic to be investigated:** **Research:** Any reference to book / internet (web) / person consulted etc.	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls:** Identify any ***three*** variables and/or indicate how some of these need to be controlled or held fixed: types of fabric / amount (size) of fabric / quantity of water in calorimeters (containers) / initial temp. of water in calorimeter (containers) / drop in temperature / identical (similar) calorimeters (containers) / same wetting procedure / same conditions / same thermometer / same (similar) lids / same length of time / wet fabric vs. dry	(4 + 3 + 3)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***three*** pieces of equipment used: three calorimeters (containers) / denim and two other fabrics / thermometers (temp probe) / hot water / graduated cylinder(s) / kettle (Bunsen / hot plate) / elastic bands (method of securing)/ scissors / gloves (tongs) / lids / stop clock (watch / timer)	(2 + 2 + 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify any ***three*** tasks carried out in investigation: measuring (cutting) same size pieces of fabric / attach fabric to calorimeters/ measure volume of water / add hot water / monitor temperature over time / soak fabric / repeat with wet fabric / record data / graph	(2 + 2 + 1)

Procedure	Procedure, apparatus, safety, data collection/observations ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations	20	**Safety:** Identify any ***two*** **specific** safety precaution followed in conducting the investigation **Procedure:** State <u>or</u> Show Identify any ***five*** steps taken in conducting investigation: measuring (cutting) pieces of fabric / attaching fabric to calorimeters (containers) / heating the water / measuring hot water / adding hot water into calorimeters (containers) / note initial temperature / recording temperature drop / record data / repeat to verify / soak fabrics / repeat with wet fabrics / graph results **Recorded Data / Observations:** Identify any ***two*** points related to method used: temperatures over time // for wet and/or dry material [Table presentation likely]	(3 + 2) (3 +3 + 2 + 1 + 1) (3 + 2)
Analysis & Conclusions	Analysis ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s)	20	**Calculations / Data analysis:** ***One*** relevant comment analysing data **or** calculation **or** graph Limited manipulation of data **OR** Good manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **or** evaluation of results obtained Limited treatment **OR** Good treatment	 (7) (10) (7) (10)
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	***One*** comment on **refinement / extension / source of error**: Reliability of data / how process could be improved / sources of error / possible reason for unexpected result / possible extension of the investigation Limited comprehension **OR** Good comprehension	 (7) (10)

OWN INVESTIGATION – Marking Criteria for Coursework B

Guide to mark assignment				
Section	**Aims**		**Total Mark**	**O.L.**
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	10	**Statement / identification of problem / hypothesis statement / topic to be investigated:** (must elaborate on title) **Research:** Any ***two*** references to book / web / person consulted etc (must qualify why this person was a suitable consultant)	(6) (2 × 2)
Preparation and planning	Identification of variables and controls List of equipment needed for the investigation List of tasks to be carried out during the investigation	40	**Variables & Controls*:** Identify any ***four*** variables / controls: **Equipment needed:** Identify any ***five*** pieces of equipment used **List of tasks:** Identify any ***three*** tasks carried out in investigation * If variables/controls not relevant to the type of investigation undertaken allow 10 marks for stating so and then readjust equipment to (5 × 3) and tasks to (3 × 5)	(4 × 5) (5 × 2) (4 + 4 + 2)
Procedure	Procedure, apparatus, safety, data collection/observations ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations	40	**Safety:** Identify any ***two*** safety precautions followed in conducting the investigation **Procedure:** State <u>or</u> Show Identify any ***eight*** steps taken in conducting investigation **Recorded Data / Observations:** Identify any ***two*** points related to method used [Table presentation likely]	(2 × 3) (8 × 3) (2 × 5)
Analysis & Conclusions	Analysis ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s)	40	**Calculations / Data analysis:** ***Two*** relevant comments analysing data **or** calculation **or** graph Limited manipulation of data **OR** Good manipulation of data **Conclusion:** ***Two*** relevant conclusions drawn **or** evaluation of results obtained Limited treatment **OR** Good treatment	(7) (10) } × 2 (7) (10) } × 2
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	20	***Three*** comments on **refinements / extensions / sources of error** e.g. What was learnt* / reliability of data / how process could be improved / sources of error / extension of investigation / possible reason for unexpected result * Other than conclusions already stated	(10 + 5 + 5)