Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2011

Marking Scheme

Science

Ordinary Level

SCIENCE ORDINARY LEVEL 2011

Summary of Marking Scheme

BIOLOGY

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

CHEMISTRY

Question 4		(7 × 6 + 1 × 10)
Question 5	(a)	(6), (3), (3), (2 x 6), (2 x 3)
	(b)	(3 × 3)
Question 6	(a)	(3), (3), (2 × 3), (6)
	(b)	(5 x 3), (6)

PHYSICS

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

BIOLOGY

Question 1

(a) A - Magnifying (3)

B - Focusing (3)

(b) Heart / lungs (3)

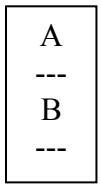
Support / movement / blood cell production / shape (form, structure) (3)

(c) A - Lens (3)

B (3)

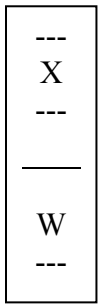
(d) A - Penis (3)

B - Sperm (3)



(e) X - Bladder (3)

W - Urine (3)



(f) A - Strawberry (3)

W- Sycamore (3)

Sycamore	Strawberry
W	A

(g) Rosebush (3)

Ladybird (3)

Rosebush	Aphid	Ladybird

(h) Piece of equipment e.g. pooter, pitfall trap, (sweeping) net, etc (3)

Diagram (matched) (3)

How to set up or use (matched) (4)

Question 2

(a) T - Incisor

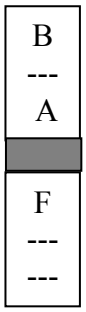
F - Biting

(2 × 3)

(b) A - Oesophagus

B - Intestine

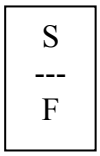
F - Digestion



(3 × 3)

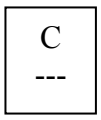
(c) (i) F - Cheese

(ii) S - Potato



(2 x 3)

(iii) C - Iodine solution



(6)

(d) **State or show**

Food on fire // container of water // thermometer (temperature probe) // result (4 × 3)

Relevant labelled diagram [diagram must include at least one label – no diagram deduct 3 marks]

[Marks awarded in context of valid experiment]

Question 3

(a) Cell wall

Cell membrane

Cell wall / chloroplast / *accept* vacuole

Nucleus (3 × 3 + 6)

(b) Drops / lowers

Root

Evaporation (3 × 3)

(c) No water (No H_2O / moisture)

Too cold / no warmth / not a suitable temperature

No oxygen (O_2) / no air (3 × 3)

Moisture // oxygen (air) // warmth (suitable temperature)
period of dormancy over // light

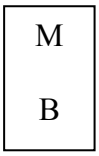
(***any*** 2 × 3)

CHEMISTRY

Question 4

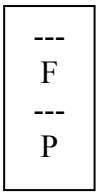
(a) M - Melting (3)

B - Boiling (3)



(b) F - Oil (3)

P - Carbon dioxide (3)

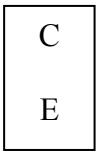


(c) X - Hydrogen peroxide (H_2O_2) (3)

Y - Manganese dioxide (MnO_2) (3)

(d) C - Water (3)

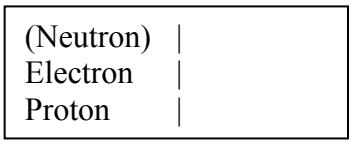
E - Nitrogen (3)



(e) Methane (6)

(f) Electron (3)

Proton (3)



(g) Covalent (6)

(h) (i) A (3)

(ii) Calcium / magnesium (3)

(iii) Boiling / ion exchange / softener / distil / washing soda (4)

Question 5

(a) (i) D / mortar and pestle (6)

(ii) Beaker (3)

(iii) Bunsen burner / Bunsen (3)

(iv) **Name:** Filtration (6)

Explain: (Dirt) too big / Pore (holes) too small / does not fit through / does not dissolve (6)

(v) Evaporation

Distillation

Technique	Evaporation	Distillation

(2 x 3)

(b) (i) Water (H_2O) / named suitable solvent / acetone / alcohol / named alcohol

(ii) Colour(s) / ink(s) rise

(iii) To prevent it dissolving (3 × 3)

Question 6

(a) **No marks for naming an alternative indicator**

(i)

Litmus	Methyl orange	Phenolphthalein	Universal
Red	Red	Colourless	Red/orange/yellow

(3)

(ii)

Litmus	Methyl orange	Phenolphthalein	Universal
Blue	Orange/Yellow	Fuchsia/pink	Green/blue/violet

(3)

(iii) Dip (add/spot) litmus (indicator) / use pH meter (probe) (3)

Appropriate matched colour / pH less than 7 (3)

(iv) Neutral (6)

(b) (i) **A** Pipette (3)

B Burette (3)

C **(**Conical) flask (3)

(ii) B / Burette (3)

(iii) Changes colour (3)

(iv) Sodium Chloride / NaCl (6)

PHYSICS

Question 7

(a) Repel / push away (3)

Repel (3)

(b) A (3)

Safety / protection / prevent overload / prevent fire (3)

(c) Vibrations (3)

Echo (3)

(d) Parallel (3)

Series (3)

(e) Force (3)

Lever (*accept* Force) (3)

(f) Tidal (3)

Solar (3)

R

R

(g) Heats it / gets hot (warm) (3)

Any appliance using heating effect e.g. kettle, immersion, toaster hair dryer / dishwasher etc (3)

(h) 20 (3)

2 (3)

g/cm^3 (gcm^{-3}, kg/m^3 , kgm^{-3}) (4)

Question 8

(a) (i) Meter stick / measuring tape / trundle wheel / laser / sonar (any correct appliance) (3)

(ii) (Stop)watch / (stop)clock / timer (3)

(iii) 25 (3)

(iv) 5 (3)

(v) No (2 × 3)

Speed is the same / straight line graph

(b) North (pole) (3)

(Plotting) compass / iron filings (3)

First option (3)

(c) Any ***three*** from

Electrical to heat //
chemical to electrical //
chemical to heat //
electrical to sound

R
R
R
R

(2 × 3 + 6)

Question 9

(a) Light ray coming back off mirror (3)

Angle approximately correct (3)

Reflection (3)

Periscope

Down the tube (second mirror / B) (stated or shown)

Look over (around) objects / submarines (6 + 2 × 3)

(b) Expand // when heated (hot) (2 × 3)

(c) Conduction (3)

Conduct (carry) heat // correct order of conductivity [minimum 2 materials] (2 x 3)

Fair test / compare like with like (3)

BIOLOGY – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	**Carry out an investigation to study the anaerobic respiration of yeast with particular reference to (i) the change of temperature with time, (ii) the evolution of carbon dioxide with time and (iii) the change in density with time.**	**O.L.**
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites	5	**Statement / identification of problem / topic to be investigated:** **Research:** Any reference to book / internet (web) / person consulted etc / evidence of research	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls :** Only if the experiment was repeated and results averaged would certain parameters need to be replicated i.e. controlled. These would include: concentration of glucose, concentration and source of yeast, initial temperature etc. **Measurable quantities:** temperature // time// carbon dioxide production // density ***OR*** [If **stated:** variables/controls not relevant to investigation ***allow*** **5 marks**]	(2 + 1 + 1 + 1)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***five*** pieces of equipment used: Water // Oil // Glucose (sugar) // Yeast // Beakers // Thermometer (temp. sensor) // Water bath (hotplate) // balance // Hydrometer // Thermos flask (tinfoil + cotton wool) // Retort stand // Data logger // Carbon dioxide sensor // Bungs // Timer (stopwatch) // Any valid piece of equipment pertinent to procedure (except safety equipment)	(5 x 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify ***one task pertinent to each experiment*** **and** any other ***three*** tasks carried out in investigations: Monitor temperature // monitor carbon dioxide evolution // monitor density of solution // monitor time Procure (prepare) yeast // prepare glucose (sugar) solution // create (maintain) anaerobic conditions // allow time for reaction(s) to occur //maintaining suitable temperature // record data // graph (or otherwise present)	(2 + 2 + 1) (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: <u>State or Show</u>
			Identify any ***six*** steps taken in conducting these investigations, ***<u>three steps common to the 3 experiments and one step pertinent to each experiment.</u>***
			
			Common Steps:
			Prepare sugar solution // prepare yeast solution // mix in container //create anaerobic conditions // plug opening // start timer// record data // present data (table, graph)
			
			(i) **Temperature and time:** mix in vacuum flask(lagged container)// thermometer (probe) in // record temperature at regular intervals
			
			(ii) **Carbon dioxide and time:** set up for measurement of CO_2 (e.g. CO_2 sensor, pressure sensor, gas syringe, balance) // maintain suitable temperature // note measurements of CO_2 at regular intervals
			
			(iii) **Density and time:** flask on balance // maintain suitable temperature // record mass at regular intervals // measure volume of mix // calculate density at regular intervals // measure density at regular intervals (hydrometer)
			
			Recorded Data / Observations:
			Temperature *versus* **time**
			Carbon dioxide *versus* **time**
			Density *versus* **time** [Table presentation likely]
				(3 + 2)
				
				(2 +2 + 1)
				
				(2 + 2 + 1)
				
				(2 + 2 + 1)

Analysis & Conclusions	▪ 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 **OR** Excellent manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **and** evaluation of results obtained Limited treatment **OR** Good treatment **OR** Excellent treatment	 (4) (7) (10) (4) (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 **OR** Excellent comprehension	 (4) (7) (10)

CHEMISTRY – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	**Carry out an investigation to study the pH changes that take place when neutralisation reactions occur between two named acids and a named base**	**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 / evidence of research	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls :** Identify ***four*** variables, **two essential** variables and any **two other** variables, and/or indicate how some of these need to be controlled or held fixed. **<u>Essential Variables</u>:** Two named acids // pH of mixture **<u>Other Variables</u>:** Named base // concentration of acids used // concentration of base used // Definite volume of acid (base) at start // Volume added from burette (aliquot) // temperature // same method to measure pH	(3 + 3) (2 + 2)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***five*** pieces of equipment used: pH meter (universal indicator) (pH sensor) // Two named acids // One named base // (Deionised) (distilled) water // Retort stand // Beakers (flasks) (Test tubes) // Funnel // Buffer solutions // Stirrer (Glass rods) // Pipette // Pipette filler // Graduated cylinder (burette) (dropper) // Any valid piece of equipment pertinent to procedure (except safety equipment)	(5 × 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify any ***three*** tasks carried out in investigation: Procure (prepare) acids // procure (prepare) base // calibrate pH probe // set acid 1 *versus* base // repeat with acid 2 *versus* base // measure (note) pH as addition made // record data // graph (or otherwise present)	(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: <u>State or Show</u>** Identify any ***five*** steps taken in conducting investigation: Rinse glassware with deionised (distilled) water // rinse burette (pipette) with solution to be used in it // measure volume of acid (base)// put acid (base) in flask // fill burette with base (acid) // calibrate pH probe // put pH probe (universal indicator solution) into flask // add acid (base) in small amounts // mix // measure pH // continue adding until there is no further change in pH // repeat to verify data // repeat with second acid // record data // present data (table, graph) **Recorded Data / Observations:** **Acid 1** *versus* **pH** **Acid 2** *versus* **pH** [Table presentation likely]	(3 + 2) (3 + 3 + 2 + 1+ 1) (3) (2)
Analysis & Conclusions	▪ 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 **OR** Excellent manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **and** evaluation of results obtained Limited treatment **OR** Good treatment **OR** Excellent treatment	 (4) (7) (10) (4) (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 **OR** Excellent comprehension	 (4) (7) (10)

PHYSICS – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	**Aims**	**Total Mark**	**Investigate the factors that determine the force of friction between a wooden block and the surface on which it is resting.**	**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 / evidence of research	(3) (2)
Preparation and planning	Identification of variables and controls as required	20	**Variables / Controls:** **Note**: ***static or limiting friction*** is the maximum force that can be applied without motion occurring and ***dynamic friction*** is the force that will produce movement at constant speed. Accept treatment of either type Identify ***four*** variables, **two essential** variables and any **two other** variables and/or indicate how some of these need to be controlled or held fixed **<u>Essential variables</u>**: Weight of block // Contact area // Type of surface (rough, smooth) on which the block rests (moves) // Force applied to move block ***Depending on variable student changes, essential variables can become other variables*** **<u>Other variables</u>:** Presence or absence of lubricant // same block// same start position // same method to measure force of friction	(3 + 3) (2 + 2)
	List of equipment needed for the investigation		**Equipment needed:** Identify any ***five*** pieces of equipment used: Block(s) // spring balance (force sensors) // String // Weights (more blocks) // Meter stick (tape measure) // pulley // elastic strip // hook // Surface(s) on which to pull blocks // Any valid piece of equipment pertinent to procedure (except safety equipment)	(5 x 1)
	List of tasks to be carried out during the investigation		**List of tasks**: Identify any ***three*** tasks carried out in investigation: Procure (prepare) block(s) // set up on surface // set (vary) factor 1 // set (vary) factor 2 // set (vary) factor 3 // ensure that only the variable under test is varied at a time // zero spring balance // measure force of friction // record data // graph (or otherwise present)	(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: <u>State or Show</u>** Identify any ***five*** steps taken in conducting investigation: Mass (weigh) block// block on surface // zero spring balance // attach spring balance (force sensor) to block // attach string to block // pass string over pulley // attach slotted weight set to string // tension elastic fixed amount // pull spring balance (force sensor) to move block at constant speed *or* to a point at which it is just about to move // add weights to string to give same effect // release elastic causing block to move // record force (weight on string), (distance travelled by block) // repeat to verify data // repeat with different weights on block (stack blocks) // area of contact of block with surface // texture of surface on which block moves // repeat procedure to verify second factor // record data // present data (table, graph) **Recorded Data / Observations:** **Factor 1** *versus* **force** **Factor 2** *versus* **force** [Table presentation likely]	(3 + 2) (3 + 3 + 2 + 1 + 1) (3) (2)
Analysis & Conclusions	▪ 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 **OR** Excellent manipulation of data **Conclusion:** ***One*** relevant conclusion drawn **and** evaluation of results obtained Limited treatment **OR** Good treatment **OR** Excellent treatment	 (4) (7) (10) (4) (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 **OR** Excellent comprehension	 (4) (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: Must include **two essentia**l variables with respect to title. **Any two other** relevant variables **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)	 (2 × 6) (2 × 4) (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 **OR** Good **OR** Excellent manipulation of data **Conclusion:** ***Two*** relevant conclusions drawn **and** evaluation of results obtained Limited treatment **OR** Good treatment **OR** Excellent treatment	 (4) (7) (10) } × 2 (4) (7) (10) } × 2
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	20	***Four*** 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	(5 + 5 + 5 + 5)