



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2012

Marking Scheme

Science

Higher Level

SCIENCE HIGHER LEVEL 2012

Summary of Marking Scheme

BIOLOGY

Question 1		(7 × 6 + 1 × 10)
Question 2	(a)	(15)
	(b)	(6), (18)
Question 3	(a)	(3), (15) (3), (3), (3)
	(b)	(3), (3), (3), (3)

CHEMISTRY

Question 4		(7 × 6 + 1 × 10)
Question 5	(a)	(9), (3), (3)
	(b)	(6), (3)
	(c)	(9)
	(d)	(6)
Question 6	(a)	(24)
	(b)	(6)
	(c)	(9)

PHYSICS

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

Biology (130 MARKS)
Answer each of the questions 1, 2 and 3.

Question 1. (52 Marks) All Items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)

- (a) **any two from:** protein (amino acids)/ fat/ carbohydrate (sugar)/ minerals/ vitamins... (2 × 3) [6]
do not accept: starch
- (b) contains cells (3)
any one from: oxygen/ carbon dioxide/ food/ name of digested food/ wastes/ urea/ ions/ hormones/ water/ minerals/ vitamins/ cholesterol/ ... (3) [6]
accept: alcohol/ drugs
- (c) **any one from:** release of carbon dioxide (methane) (nitrous oxide)/ burning fossil fuels/ deforestation... (3)
any one from: sea level rise/ sea temperature rise/ drop of oxygen in seas/ heat waves/ floods/ fires/ drought/ melting of glaciers (polar ice sheets)/ malnutrition/ increase in spread of infectious diseases/ famine/ changes in ocean currents/ weather changes... (3) [6]
- (d) **any one from:** prevention of the fusion of gametes (sperm and egg)/ prevention of fertilisation/ prevention of pregnancy (3)
any one from: breast feeding may prevent ovulation/ diaphragm/ condom/ pill/ IUD (intrauterine devices)/ spermicides/ bar (hormonal implant)/ rhythm method (inetrcourse outside the woman’s fertile time)... (3) [6]
- (e) **any one from:** transports water/ minerals (3)
transports sucrose (sugar) (food) (3) [6]
allow (3) for reverse order
- (f) DNA (3)
protein (3) [6]
- (g) grass/ potato/ strawberry/ onion/ crocus... (3)
underground stems (rhizomes)/ tuber/ runner (stolon)/ bulb/ corm... (3) [6]
note: name and mode of asexual reproduction must be matched for 2nd (3)
- (h) hinge (2)
motion in one plane/ backward and forward/ up and down/ raise and lower (2)
the biceps (muscle) contracts bringing bones closer... (3)
the triceps (muscle) contracts bringing bones apart... (3)
or or
antagonistic muscles (biceps & triceps) (pair of muscles) (3)
cause movement in opposite directions... (3) [10]
- do not accept:** ‘one direction’ for movements or muscles ‘expand’ causing movement

Question 2. (39 marks) All items, (a) and (b).

- (a) Give **any five from:**
- renal artery: brings blood to the kidney
 - kidney: filters blood/ removes waste/ excretes /makes urine/ cleans blood/ helps water balance...
 - renal vein: collects blood from the kidney/ returns blood to body (heart)
 - ureter: carries urine (wastes) (urea) from the kidneys to the bladder
 - bladder: collects (stores) urine
 - urethra: releases urine/. allows sperm to leave
- (5 × 3) **[15]**
- (b) (i) Name gas in: carbon dioxide (CO₂) (3)
- gas out: oxygen (O₂)/ water vapour (H₂O) (3) **[6]**
- (iii) Describe **show or state:**
- cover leaf of plant with aluminium foil (3)
 - plant in dark for some time / de-starch plant (3)
 - plant in bright light for some time (3)
 - remove chlorophyll (boil in alcohol) (3)
 - add iodine to leaves (3)
 - only leaf exposed to light goes blue-black (3) **[18]**

Question 3. (39 marks) All items, (a) and (b)

(a) (i) <u>Give</u>	Wind/ water/ artificial e.g. using a brush... accept: named animal that pollinates	(3)	[3]
(ii) <u>Draw</u>	stigma drawn and labelled correctly style drawn and labelled correctly ovary drawn and labelled correctly anther drawn and labelled correctly filament drawn and labelled correctly	(3) (3) (3) (3) (3)	[15]
if a carpel and a stamen are drawn separately (alone) allow marks for correctly labelled parts. Deduct [3] for no flower.			
(iii) <u>Name</u>	anther do not accept: stamen	(3)	[3]
(iv) <u>Name</u>	ovule accept: ovary do not accept: carpel	(3)	[3]
(v) <u>What?</u>	zygote/ seed formation (dispersal)/ fruit formation	(3)	[3]
(b) (i) <u>Name</u>	amylase	(3)	[3]
(ii) <u>Name</u>	starch	(3)	[3]
(iii) <u>Name</u>	maltose	(3)	[3]
(iv) <u>What?</u>	any one from: iodine solution/ Benedict's solution/ Fehling's solution	(3)	[3]

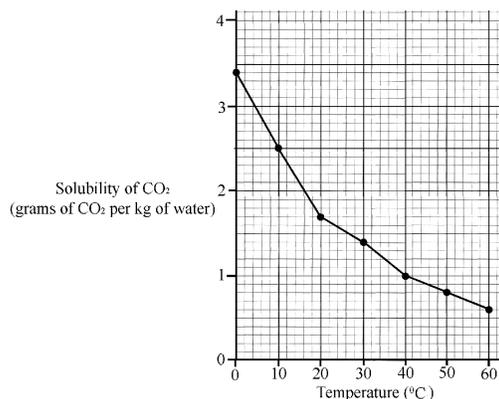
Chemistry (130 MARKS)
Answer each of the questions 4, 5 and 6.

Question 4. (52 marks) All items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)

- (a) **any one from:** solder/ steel/ brass/ bronze... (3)
one use correctly matched: solder-joining metals/ steel-girders, car bodies, tools, nails, screws, hinges.../ brass-plug pins, keys, musical instruments, hinges, screws, door handles.../ bronze-sculptures, bells, coins, medals, bearings, springs, hammers, ships propeller... (3) [6]
- (b) carbon dioxide/ CO₂ (3)
 blue turns red (3) [6]
- (c) hard water (3)
 limescale/ calcium carbonate/ magnesium carbonate/ correct formula (3) [6]
- (d) Ca, Mg, Zn, Cu (6) [6]
allow (3) for reverse order/ using names not symbols in correct order
- (e) ionic (3)
 oppositely charged ions (positive and negative ions) (Na⁺ and Cl⁻) attract (3) [6]
- (f) **any one from:** orange juice/ rainwater/ vinegar/ sour milk/ cola (3)
any one from: toothpaste/ bread soda/ milk of magnesia/ washing soda (3) [6]
 9g
- (g) **any two names or symbols:** H, He, B, C, N, O, F, Ne, Si, P, S, Cl, Ar, As, Se, Br, Kr, Te, I, Xe, Rn (2 × 3) [6]
- (h) (i) because the ink dot would dissolve into the liquid/ ink would not rise up the paper/ ink soluble (4)
- (ii) they were carried up by the liquid/ capillarity (4)
- (iii) the brown ink was a mixture of inks/ made up of different colours (2) [10]

Question 5. (39 Marks) All items, (a), (b), (c) and (d).

- (a) (i) Draw seven points correctly plotted (6)
allow (3) for four points correctly plotted
 curve through plotted points (3) [9]



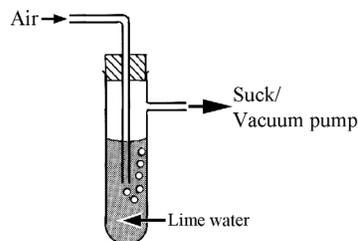
- (ii) Suggest **any one from:** increase the motion of gases/ allow them to escape/ weak attractive forces / gases expand/ gases rise/ gases less dense/ bubbles form/ gas molecules have more energy... (3) [3]

- (iii) Estimate 16 °C +/- 2 °C (3) [3]
allow (2) for 10.6 °C

- (b) (i) Which? CO₂, H₂O (2 × 3) [6]

- (ii) Suggest **any one from:** temperature changes/ weather/ evaporation / rain/ snow/ transpiration/ plants/ respiration/ combustion/ photosynthesis/ specified location... (3) [3]

- (c) Describe
show or state:
 draw air through (3)
 lime water (3)
 lime water goes milky (3) [9]
[no diagram deduct 3 marks, one label is required]



- (d) Give anhydrous (white) copper sulphate/ cobalt chloride paper (3)
matched: turns blue/turns pink (3) [6]
allow (3) for 'turns blue' if anhydrous **or** white is omitted above

Question 6. (39 marks) All items, (a), (b) and (c).

- (a) Name and Describe (i) to (iv) **accept correct processes in any order.**
any four named from: screening/ flocculation/
sedimentation (settling) / filtration/ ion exchange/ pH
adjustment/ adsorption/ named mode of disinfect ion:
(chlorination) (ozonization) (uv) (irradiation)/ fluoridation (4 × 3)
- any four described and correctly matched, from:** removal of
large items/ combine (coagulate) small particles into larger
particles/ particles sink to bottom/ filtration clarifies water
(remove all particles from the water) (water passed through
sand filters)/ remove unwanted dissolved materials/ base
added to prevent corrosion of pipes/ taste, (colour) and
(odour) causing compounds can stick to powder (activated
carbon) and are removed/ add chlorine (kills micro-
organisms) (bacteria...) (safe to drink)/ add fluoride
(help prevent tooth decay) (4 × 3) **[24]**
- (b) Rule (i) and Rule (ii) **any two from:** do not enter the laboratory without
permission/ do not use any item without permission/ do not
use any item without knowing how to use it/ tie back long
hair/ wear eye protection when necessary/ check the label on
the container before using some of the contents/ never eat in a
laboratory/ if you get something into to you mouth by
accident, spit it out and inform your teacher/ any accident
must be reported to the teacher immediately/ chemical spills
must be reported and cleaned up/ wear a laboratory coat
always/ wash chemicals from eyes and skin immediately and
report to your teacher/ wash your hands before leaving... (2 × 3) **[6]**
- (c) Name correctly named alkali metal e.g. potassium (3)
Describe burns/ flame/ sparks/ explodes... (3)
e.g. potassium hydroxide (KOH)/ hydrogen (H₂) (3) **[9]**

Physics (130 MARKS)
Answer each of the questions 7, 8 and 9.

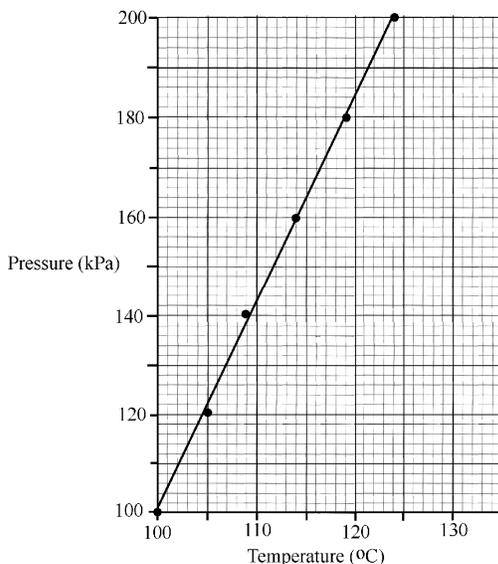
Question 7. (52 marks) All items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)

- (a) liquid to gas (vapour) (3)
energy/ heat (3) [6]
- (b) dc: flows in one direction (3)
ac: flows in one direction and then in the opposite direction/ changes direction (3) [6]
do not accept: ‘stays the same’ for dc or ‘changes’ for ac. What ‘stays the same’ or ‘changes’ i.e. direction must be specified.
- (c) refraction (6)
or *or*
light changes direction (bends) (3)
when it enters (leaves) the drink (3) [6]
- (d) **any two from:** falling down the stairs: potential energy to kinetic energy and sound energy/ car: chemical energy to kinetic and heat energy/ photosynthesis: nuclear energy to light energy to chemical energy/ washing machine: electrical energy to heat, kinetic and sound energy/ respiration: chemical energy to heat energy and kinetic energy... (2 × 3) [6]
note: single conversions, e.g. door bell: electrical energy to sound energy, is all that is required for (3). Two correct single conversions merit (2 × 3)
- (e) Heat/ high temperature (3)
expansion (3) [6]
- (f) hole at bottom (3)
greater pressure/ greater depth (3) [6]
- (g) too much current causes the wire to melt (3)
breaking the circuit (3) [6]
accept: fuse blows/ limits amount of current for (3)
- (h) **note:** no marks for selecting two energies
(i) **any two, correctly matched, from:** no carbon dioxide (CO₂) produced/ carbon dioxide (CO₂) removed absorbed/ carbon neutral/. hydroelectric plants are long-lived/ solar heating can provide hot water/ solar power panels supply electricity / tidal generators are submerged (their rotors turn slowly) (sea life is safe)/ wave generators are moored off-shore (just ‘bob up and down’)... (2)
(3)
- (ii) **any two, correctly matched, from:** wind turbines, in some areas, are objected to as unsightly (noise) (kill birds)/ large solar power plants use a lot of water (need huge area) the rest of this list also applies to solar heating (direction of the sun changes) (changes in seasons) (day to night) (cloud cover)/ the construction of hydroelectric plants can cause dislocation of people (release of large amounts of carbon dioxide due cement production required)/ biomass uses land that could be used for food production (uses food crops to make biofuels)... (2)
(3) [10]
do not accept: ‘expensive’ or ‘not expensive’ for (i) or (ii), a definition of renewable energy for (i) e.g. ‘will not run out’. **Look for:** items (i) & (ii) specific to candidate-selected energies.

Question 8. (39 marks) All items, (a) and (b)

(a) Define $\frac{\text{force}}{\text{area}}$ / force per unit area (3) [3]

(i) Draw six points correctly plotted (6)
allow (3) for four points correctly plotted
straight line through, or close to, six points (3) [9]



(ii) What? boiling point increases with pressure/
 linear (straight line) (increase in boiling point is proportional
 to increase in pressure) (3) [6]

(iii) What? reduce boiling point (3) [3]

(b) (i) Give **any two from:** review cost of electricity on a daily basis/
 locate what part of the house costs most (least)/ budget (save
 money)/ much better than alternative; reading supplier's
 meter and calculating... (2 × 3) [6]

(ii) Define Joules per second (J/s) (Js^{-1}) / Nm per second/ kgms^{-3} ...
accept: rate of doing work/ rate of energy conversion/
 $\frac{\text{work}}{\text{time}}$ / $\frac{\text{energy}}{\text{time}}$ (6) [6]

(iii) State chemical effect, **any one from:** electroplating/ charging a
 battery/ anodising/ electrolysis... (3)
magnetic effect, **any one from:** electromagnet/ door bell/
 electric motor/ transformer/ loudspeaker/ relay/ car door
 locks/ ac adapter... (3) [6]

Question 9. (39 marks) All items, (a), (b), (c), etc.

- | | | | | |
|-----|------------------|---|-----|-----|
| (a) | (i) <u>Name</u> | B resistor | (3) | |
| | | C LED (light emitting diode) | (3) | [6] |
| | (ii) <u>Give</u> | A supplies electricity (electrical energy), (direct current), (DC), (energy), (power), (current)... | (3) | |
| | | B controls (regulates) (reduces) current/ protects LED | (3) | [6] |
| | (iii) | circuit | (3) | |
| | <u>Produce</u> | LDR | (3) | |
| | | Ohmmeter/ multimeter set to measure Ohms | (3) | [9] |
| (b) | Why? | comb has charge/ static electricity | (6) | [6] |
| (c) | (ii) | like poles | (3) | |
| | <u>Explain</u> | repel | (3) | [6] |
| (d) | (iii) | gravity | (3) | |
| | <u>What?</u> | holds the earth together/ causes weight/ keeps the planets in orbit about the sun/ holds atmosphere/ tides... | (3) | [6] |

BIOLOGY – Marking Criteria for Coursework B

Guide to mark assignment			
SECTION	Total Mark	Investigate named seeds, chosen by you, to examine the effects of (a) placing the seeds in a fridge for a few days before sowing, (b) placing the seeds in a hot press for a few days before sowing on (i) the percentage of seeds that germinate, (ii) the speed of germination of the seeds.	H.L.
Introduction	5	<p>Statement / identification of problem / topic to be investigated:</p> <p>Research: Any reference to book / internet (web) / person consulted etc / evidence of research</p>	<p>(2)</p> <p>(3)</p>
Preparation and planning	20	<p>Variables / Controls: Identify <i>six</i> variables, any three essential variables and any three other variables, and/or indicate how some of these need to be controlled or held fixed.</p> <p>Essential Variables: Location of seeds before sowing // percentage (number) of seeds that germinate // speed of germination of seeds</p> <p>Other Variables: Same seed type // same number of seeds // same time // same volume of water // same growth containers // same growth medium // same germination conditions (similar environment) // seeds at room temperature</p> <p>Equipment needed: Identify any <i>five</i> pieces of equipment used: Named seed(s) // water // growth containers // growth medium (cotton wool) (filter paper) (soil) etc // graduated cylinder // thermometer (temp. sensor) // hot press (incubator) // fridge // forceps // labels // droppers // any valid piece of equipment pertinent to procedure (except safety equipment)</p> <p>List of tasks: Identify any <i>four</i> tasks carried out in investigation: Procure seeds // leave set seeds in fridge (hot press) // leave set seeds at room temperature (control) // prepare growth medium // plant seeds // leave seeds to germinate // monitor for germination // record data // reference to calculations</p>	<p>(3 × 2)</p> <p>(1 + 1 + 2)</p> <p>(5 × 1)</p> <p>(1 + 1 + 1 + 2)</p>

Procedure	20	<p>Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p>Procedure: <u>State or Show</u> Identify any <i>five</i> steps taken in conducting investigation:</p> <p>Select(obtain) seeds // store set in fridge // store set in hot press // store set at room temperature // leave seeds in named location for same time interval before sowing // put growth medium in growth container // measure volume of water // add water to growth medium // count seeds // add seeds to growth medium // label // leave seeds in same environment // monitor // record data // repeat to verify data // calculate speed of germination // calculate % germination // present data (graph)</p> <p>Recorded Data / Observations: [Table presentation likely] Identify any two points related to method used: Number/percentage of fridge seeds that germinate versus time Number/percentage of hot press seeds that germinate versus time allow (3) only for number of seeds in fridge or hot press with no reference to time</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2 + 3 + 3)</p> <p>(2 + 3)</p>
Analysis & Conclusions	20	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data <i>or</i> calculation <i>or</i> graph</p> <p>Limited manipulation of data</p> <p>Good manipulation of data</p> <p>Excellent manipulation of data</p> <p>Conclusion: <i>One</i> relevant conclusion drawn and evaluation of results obtained</p> <p>Limited treatment</p> <p>Good treatment</p> <p>Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
Comment	10	<p><i>Two</i> comments 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</p> <p>Limited comprehension</p> <p>Good comprehension</p> <p>Excellent comprehension</p>	<p>(2 × 1)</p> <p>(2 × 3)</p> <p>(2 × 5)</p>

CHEMISTRY – Marking Criteria for Coursework B

Guide to mark assignment			
SECTION	Total Mark	Investigate the effects on the amount of carbon dioxide dissolved in a fizzy drink when it is stored in (a) an open container (b) a closed container, at different conditions of (i) temperature (ii) stirring or shaking (iii) time elapsed.	H.L.
Introduction	5	<p>Statement / identification of problem / topic to be investigated:</p> <p>Research: Any reference to book / internet (web) / person consulted etc /evidence of research</p>	<p>(2)</p> <p>(3)</p>
Preparation and planning	20	<p>Variables / Controls: Identify <i>six</i> variables, any three essential variables and any three other variables, and/or indicate how some of these need to be controlled or held fixed.</p> <p>Essential Variables: Temperature // stirring (shaking) rate // time elapsed // container open or closed // amount of carbon dioxide (change in mass of container) (pH change) (pressure change)</p> <p><i>Depending on variable student changes, essential variables can become other variables</i></p> <p>Other Variables: Same type of drink // same type of container // same volume // same temperature // same stirring (shaking) rate // same time // same method of measurement of carbon dioxide (balance) (pH meter, sensor, paper) (pressure sensor)</p> <p>Equipment needed: Identify any <i>five</i> pieces of equipment used: fizzy drink //containers // lids (covers) // hotplate (Bunsen burner) //water bath // graduated cylinder // balance // thermometer (temp. sensor) // (magnetic) stirrer // stop clock (watch/timer) // pH meter (sensor, paper) // CO₂ sensor // pressure sensor // any valid piece of equipment pertinent to procedure (except safety equipment)</p> <p>List of tasks: Identify any <i>four</i> tasks carried out in investigation: Procure fizzy drink // measure volume // leave containers open(closed) // vary(set) temperature of drink // vary (set) stirring (shaking) rate of drink // vary(set) time drink is left // measure CO₂ (mass), (pH) (pressure) // record data // reference to calculations</p>	<p>(3 × 2)</p> <p>(1 + 1 + 2)</p> <p>(5 × 1)</p> <p>(1 + 1 + 1 + 2)</p>

PHYSICS – Marking Criteria for Coursework B

Guide to mark assignment			
SECTION	Total Mark	Investigate the factors that determine the rate at which heat is lost from different types of drinking cups that contain hot liquid.	H.L.
Introduction	5	Statement / identification of problem / topic to be investigated:	(2)
		Research: Any reference to book / internet (web) / person consulted etc /evidence of research	(3)
Preparation and planning	20	Variables / Controls: Identify <i>six</i> variables, any three essential variables and any three other variables , and/or indicate how some of these need to be controlled or held fixed.	
		Essential Variables: Type of cup // volume of liquid // type of liquid // colour of cup // size of cup (surface area) // thickness of cup // presence or absence of lid (cover) // initial temperature liquid // external temperature (surroundings) // heat loss (drop in temperature) // air movements // insulation // any valid variable	(3 × 2)
		Depending on variable student changes, essential variables can become other variables	
		Other Variables: Same type of cup // same volume of liquid // same type of liquid // same colour of cup // same size cup (surface area) //same thickness // presence or absence of lid (surface area exposed) // same initial temperature liquid // place in similar surroundings //same thermometer (temp. sensor) // same time interval	(1 + 1+ 2)
		Equipment needed: Identify any <i>five</i> pieces of equipment used: Named type(s) cup // lids (covers) // thermometer (temp. sensor) // water // liquids // paint // kettle (Bunsen , hotplate) // graduated cylinder // stop clock (watch/timer) // insulation // fan (hair dryer) any valid piece of equipment pertinent to procedure (except safety equipment)	(5 × 1)
		List of tasks: Identify any <i>four</i> tasks carried out in investigation: Procure cups // set (vary) factor 1 // set (vary) factor 2 // heat liquid // measure volume // add hot water// monitor temperature over time // record data // reference to calculations	(1 + 1 +1 + 2)

Procedure	20	<p>Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p>Procedure: <u>State or Show</u> Identify any <i>five</i> steps taken in conducting investigation: Get cups // heat liquid // measure volume // add hot liquid to different types of cup // note initial temperature // record temperature drop over time // record data // repeat to verify data // reference to calculations // present data (graph)</p> <p>Repeat: for different volumes of liquid // different types of liquid // different colour cups // different size of cup (surface area) / different thickness of cup // cups with (without) lid (exposed surface area) // different start temperatures of liquid // cups in different airflow // cups in different environments.//. cups with different insulation // any other valid variable</p> <p>Recorded Data / Observations: [Table presentation likely] Identify any two points related to method used:</p> <p>Factor 1 versus temperature drop</p> <p>Factor 2 versus temperature drop</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2 + 3 + 3)</p> <p>(2 + 3)</p>
Analysis & Conclusions	20	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data <i>or</i> calculation <i>or</i> graph</p> <p>Limited manipulation of data</p> <p>Good manipulation of data</p> <p>Excellent manipulation of data</p> <p>Conclusion: <i>One</i> relevant conclusion drawn and evaluation of results obtained</p> <p>Limited treatment</p> <p>Good treatment</p> <p>Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
Comment	10	<p>Two comments 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</p> <p>Limited comprehension</p> <p>Good comprehension</p> <p>Excellent comprehension</p>	<p>(2 × 1)</p> <p>(2 × 3)</p> <p>(2 × 5)</p>

OWN INVESTIGATION – Marking Criteria for Coursework B

Guide to mark assignment			
Section	Aims	Total Mark	H.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 <i>two</i> references to book / web / person consulted etc (must qualify why this person was a suitable consultant)
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 <i>six</i> variables / controls: Must include three essential variables with respect to title. Any three other relevant variables Equipment needed: Identify any <i>five</i> pieces of equipment used List of tasks: Identify any <i>four</i> 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)
Procedure	Procedure, apparatus, safety, data collection/observations <ul style="list-style-type: none"> ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations 	40	Safety: Identify any <i>two</i> safety precautions followed in conducting the investigation Procedure: State <u>or</u> Show Identify any <i>eight</i> steps taken in conducting investigation Recorded Data / Observations: Identify any <i>two</i> points related to method used [Table presentation likely]
Analysis & Conclusions	Analysis <ul style="list-style-type: none"> ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s) 	40	Calculations / Data analysis: <i>Two</i> relevant comments analysing data or calculation or graph Limited manipulation of data OR Good manipulation of data Conclusion: <i>Two</i> relevant conclusions drawn or evaluation of results obtained Limited treatment OR Good treatment
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 Limited comprehension Good comprehension Excellent comprehension