



Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE 2009

MARKING SCHEME

SCIENCE (REVISED SYLLABUS)

HIGHER LEVEL

Junior Certificate Examination

SCIENCE

Higher 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 mandatory biology investigations/experiments claimed on page 5 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of mandatory chemistry investigations/experiments claimed on page 6 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of mandatory physics investigations/experiments claimed 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.

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

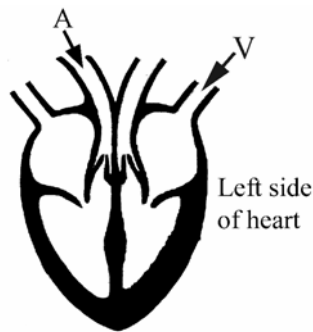
Question 1. (52 Marks) All Items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)

- (a) **any two from:** photosynthesis (make food)/ gaseous exchange (gases enter and leave the leaf) (carbon dioxide in or out) (oxygen out or in)/ transpiration.(water vapour out of leaf)/ food storage/ respiration (2 × 3) [6]
note: names of processes are underlined, accept descriptions in brackets.

- (b) (i) **name:** kidney (3)
(ii) **function:** excretion/ make urine/ excrete (remove from the body) water (salts) (urea)... (3) [6]

- (c) (i) **what?:** magnification/ make small things appear larger/ see cells (3)
(ii) **name:** stage (3) [6]

- (d) **label**



(3)
(3) [6]

- (e) (i) **why? any one from:** colonise new places/ reduce competition (overcrowding)/ increase survival (3)
(ii) **give, any one from:** animal/ self/ water (3) [6]

- (f) (i) **why?:** move/ meet the egg (3)
(ii) **where?:** fallopian tube (oviduct)/ ovary (ovule) of plants (3) [6]

- (g) (i) **name, any one from:** buttercup/ grass/ raspberry / strawberry/ daffodil/ onion/ garlic/ potato/ spider plant...**accept:** mushroom (3)
(ii) **describe, matched to named plant:** runners or rhizomes (buttercup/ grass/ raspberry / strawberry)/ bulbs or corms (onion/ garlic)/ tubers (potato)/ plantlets (spider plant)... (3) [6]
note: mode of reproduction underlined, matched plants in brackets.
accept: cutting/ layering...

- (h) (i) **what?:** (feed) (supply nutrients) (food) (growing medium) (3)
(ii) **why?:** control/ check that agar is not contaminated (3)
(iii) **describe:** patches on the surface (growth) (2)
explain any one from: micro-organisms/ bacteria/ fungi are growing (2) [10]

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

- | | | | | |
|-----|---------------------|---|------------|------------|
| (a) | (i) <u>Name</u> | bone A: humerus
bone B: femur | (3)
(3) | [6] |
| | (ii) <u>What?</u> | type of joint: hinge | (3) | [3] |
| | (iii) <u>Give</u> | function of C any one from: lubricates/ helps free movement/
reduces friction
function of D: holds the bones together | (3)
(3) | [6] |
| | (iv) <u>Explain</u> | show or state:
pairs of muscles that (they) pull (contract) (work)
in opposite directions | (3)
(3) | [6] |
| (b) | (i) <u>Name</u> | liquid A: limewater | (3) | [3] |
| | (ii) <u>Which?</u> | X | (3) | [3] |
| | (iii) <u>Why?</u> | carbon dioxide (CO ₂) | (3) | [3] |
| | (iv) <u>What?</u> | conclusion: more carbon dioxide in exhaled air | (3) | [3] |
| | (v) <u>Complete</u> | oxygen (O ₂)
carbon dioxide (CO ₂) | (3)
(3) | [6] |

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

- (a) (i) How? any suitable method e.g. throw (3) [3]
- (ii) Give names (types) of plants (animals) present (3)
number (frequency) (%) of each plant (animal) present (3) [6]
- (b) (i) What? length of string (rope) with a mark (knot) every metre (at intervals) (3) [3]
- (ii) Describe line across area to be sampled (3)
identify plant (animal) present at each metre (mark) (3) [6]
- (c) (i) Name **any one from:** pooter/ pitfall trap/ beating tray/
Tullgren funnel/ plankton net/ small mammal trap... (3) [3]
- (ii) Draw drawing of item named in part (c) sub-part (i) (3)
one correct label, **not name of item** (3) [6]
- (iii) Describe two clear statements describing the use of the item
named in part (c) sub-part (i) (2 × 3) [6]
- (d) Give **any two from:** presence of herbivores/ presence of
carnivores/ presence of insects for pollination/
presence of nitrogen fixers/ type of soil/ soil drainage/
minerals in soil/ pH of soil/ air content of soil/ amount
of humus in soil/ water content of soil / light levels/
exposure to wind/ exposure to frost/ elevation/ salinity/
aeration of water/ currents in water/ competition/
coniferous trees/ deciduous trees... (2 × 3) [6]

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) **name, any one from:** carbon dioxide/ sulphur dioxide/ oxides of nitrogen/
 smoke/ small particles... (3)
- describe, any one from (matched):** global warming/ greenhouse effect/ acid
 rain/ kill plants/ kill fish/ damage to lungs/ lung disease/ damage to stone
 buildings/ damage to iron structures/ corrosion... (3) [6]
- If a candidate gets zero for the name but gives a correct effect of a pollutant
 present in the emissions e.g. global warming allow (3)**
- (b) (i) **give, any one from:** can flow/ allow diffusion/ don't have definite shape/
 take shape of container... (3)
- (ii) **give, any one from:** gases are compressible (liquids are incompressible)/
 gases have lower density (liquids have higher density)/ gases fill container... (3) [6]
- (c) **name, any two from:** Bunsen burner/ tripod/ pipe clay triangle/ crucible/ tubing/
 evaporating dish (2 × 3) [6]
- (d) **draw, drawing of apparatus used for:** filtration/ decanting (3)
- one correct label (3) [6]
- (e) (i) **how?:** seven (3)
- (ii) **enter:** isotopes (3) [6]
- (f) (i) **what?:** measure volume (3)
- (ii) **what any one from?:** neutralisation/ salt formed/ water formed (3) [6]
- accept:** indicator changes colour
- (g) **give any two from:** fizzy drinks/ fire extinguishers/ dry ice/ photosynthesis/
 stage effects/ refrigerant (2 × 3) [6]
- (h) (i) **describe:** burn/ light (2)
- 'popping' sound heard (2)
- (ii) **write: reactants:** $Zn + 2HCl$ (3)
- products:** $ZnCl_2 + H_2$ (3) [10]

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

- (a) (i) Name **liquid A:** hydrogen peroxide (H_2O_2) (3) [3]
- (ii) Name **solid B:** manganese dioxide (MnO_2) (3) [3]
- (iii) What? **catalyst:** speeds up (slows down) (changes rate) of a chemical reaction (3) [3]
- (iv) Give **result:** turned red (3)
- conclusion:** acidic (3) [6]
- (b) (i) State **test:** add soap (3)
- scum forms/ a lot of soap needed to form a lather (3) [6]
- (ii) Name **metallic element:** calcium/ magnesium/ iron/ aluminium (3) [3]
- (iii) Give **any one from:** limescale in kettles/ limescale in washing machines/ limescale in hot water pipes/ blocks pipes/ wastes soap/ source of calcium/ good for brewing/ may reduce heart disease/ limescale... (3) [3]
- accept:** scum forms/ a lot of soap needed to form a lather
if it does not appear in the test (i) above
- (c) (i) Name distillation (3) [3]
- (ii) Name condenser (3) [3]
- (iii) Identify part B (3) [3]
- (iv) How? **any one from:** evaporate/ no residue (3) [3]

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

- (a) (i) Name covalent (3) [3]
- (ii) Describe shared (3)
electrons (3) [6]
- (iii) Name **any one from:** carbon dioxide/ ammonia/ glucose/
methane...
accept any one from: oxygen/ hydrogen/ nitrogen/
chlorine... (3) [3]
- (b) (i) How? **sodium ions:** loses one electron (3)
chloride ions: gains one electron (3)
accept: loss, gain (order not important) for (3) only
accept: loss, gain (order important) of electrons for (6)
accept: sodium gives one electron to chlorine for (6) [6]
- (ii) What? electrical/ attraction of opposite charges (3) [3]
- (iii) Name **any one from:** magnesium oxide/ magnesium chloride/
calcium oxide/ calcium chloride/ potassium iodide... (3) [3]
- (c) (i) What? mixture of metals/ iron and carbon (carbon steels) (3) [3]
- (ii) Name **alloy, any one from:** aluminium alloys/ brass/ carbon
Give steels/ solder/ stainless steel/ steel... (3)
note: use to be matched with name
use, any one from: [drink can/ rivets/ piston/ ladder/
cooking foil/ letter box/ door handles...] [hinges/ bolts
and nuts/ screws/ plug pins/ keys/ musical instruments
...] [girder/ hinges/ bolts and nuts/ screws/ food cans/
scaffolding/ car bodies/ tools/ machinery...] [connect
metals] (3) [6]
[pipes/ cutlery/ pots/ pans/ sinks/ 'irons'...]
**note: lists in square brackets of uses are in same
order as list of names of alloys above.**
- (iii) Explain **malleable:** hammered (pressed) (flattened) (3)
ductile: pulled (stretched) (3) [6]

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) **useful energy conversions:**
- (i) electrical (electric) to magnetic (3)
 - (ii) magnetic to kinetic (3) [6]
- allow (3) for:** 'electrical to kinetic' if it is the only correct answer given.
- (b) **conclusion:** best (better) (3)
conductor (3) [6]
accept: aluminium (iron) conduct less well (poorer) for (6)
- (c) **why?:** pressure (3)
increases with depth/ greater (3) [6]
- (d) (i) **why?:** pen has charge (static) (electricity) (3)
(ii) **explain:** pen loses its (charge) (static) (electricity) (3) [6]
- (e) (i) **where?:** the sun (3)
(ii) **what?:** it travels in straight lines (3) [6]
- (f) (i) **what?:** it moves (3)
(ii) **which?:** magnetic (3) [6]
- (g) **what?:** reflection (bounce) (3)
sound (3) [6]
- (h) (i) **does?:** yes (2)
reason: bulbs in parallel/ two paths for current/ one path is not broken (3)
(ii) **does?:** no (2)
reason: bulbs in series/ single path is broken (3) [10]

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

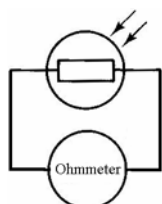
(a) (i) Name **item A:** overflow can (3)
item B: measuring (graduated) cylinder (3) **[6]**
allow (3) for items named in reverse order

(ii) Calculate **density:** $\frac{175}{125}$ gets (2) / 1.4 gets (3) (3)
Give **units:** g/cm³ **or** gcm⁻³ **or** grams per cubic centimetre (3) **[6]**

(iii) Why? **sink:** denser (3) **[3]**

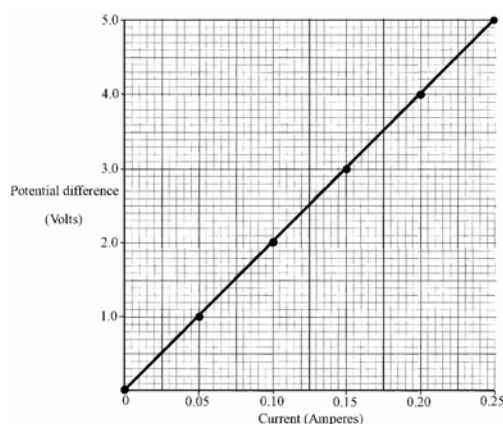
(b) (i) Give **everyday use any one from:** measure light/ switch on (off) lights/ light sensor/ alarms/ street lights/ camera... (3) **[3]**

(ii) Describe **experiment show or state:** connect the LDR to a meter that measures resistance (ohmmeter) (3)
Draw
Explain



circuit diagram: LDR symbol correct (3)
accept Ω in a circle as the symbol for an ohmmeter
explain: move light source closer (further away) from the LDR/ shade the LDR with your hand... (3) **[9]**

(c) (i) Draw



graph: five points plotted correctly (3)
line drawn through the six points (3) **[6]**
allow (6) for correct line only

(ii) Calculate **resistance:** any correct ratio e.g. $\frac{4}{0.2}$ gets (2) / 20 gets (3) (3) **[3]**

(iii) What? **evidence:** straight line through the origin (3) **[3]**

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

- | | | | | |
|---------|---------------|---|--|-------------------|
| (a) (i) | <u>Why?</u> | chips: give a smooth boil/ prevent 'explosive' boiling/ safety | (3) | [3] |
| | (ii) | <u>What?</u> | temperature: 100°C | (3) [3] |
| | (iii) | <u>What?</u> | raising pressure: raises boiling point | (3) [3] |
| | (iv) | <u>What?</u> | lowering pressure: lowers boiling point | (3) [3] |
| (b) (i) | <u>How?</u> | heat from sun: radiation/ infra red/ IR | (3) | [3] |
| | (ii) | <u>Give</u> | advantage, any one from: reduce fuel bills/ reduce CO ₂ emissions/ renewable/ ... | (3) |
| | | or | disadvantage, any one from: expensive/ less heat absorbed in winter (on cloudy days)... | or (3) [3] |
| (c) (i) | <u>Define</u> | velocity, any one from: speed/ distance travelled in unit time with direction of motion (in given direction) | (3) | [6] |
| | | allow (6) for: rate of displacement | | |
| | (ii) | <u>Use</u> | acceleration: any correct ratio e.g. $\frac{20}{2}$ gets (2) / 10 gets (3) | (3) |
| | | <u>Give</u> | units: m/s/s or ms ⁻² or metres per second per second or m/s ² | (3) [6] |
| | (iii) | <u>Name</u> | force: gravity | (3) [3] |
| | (iv) | <u>What?</u> | weight: 20/ 19.6 (i.e. using $g = 9.8 \text{ m/s}^2$) | (3) |
| | | <u>Give</u> | allow: 2 × 10 or 2 × 9.8 (2) | (3) [6] |
| | | | unit: N/ Newton | |

BIOLOGY – Marking Criteria for Coursework B

Section	Aims	Total Mark	<u>Guide to mark assignment</u>	H.L.
			Investigate the relationship between reaction temperature and the effectiveness of action of the enzyme amylase on starch	
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	<p>Statement / identification of problem / topic to be investigated:</p> <p>Research: Any reference to book / internet (web) / person consulted etc.</p>	(3) (2)
Preparation and planning	<p>Identification of variables and controls as required</p> <p>List of equipment needed for the investigation</p> <p>List of tasks to be carried out during the investigation</p>	20	<p>Variables / Controls : Identify any <i>five</i> variables and/or indicate how some of these need to be controlled or held fixed: <u>Essential Variables:</u> Temperature // Time taken for (effectiveness of) breakdown of starch <u>Other Variables (fixed)/ Controls:</u> source of enzyme (same / named) / volume of enzyme / mass (conc.) of enzyme / volume of starch / concentration (same) starch solution / same iodine / same pH (buffer) / same thermometer (temp. probe) / time sampling intervals / identical containers / starch solution only</p> <p>Equipment needed: Identify any <i>five</i> pieces of equipment used: Containers / water bath / thermometer (temp. probe) / ice / starch solution / enzyme (amylase) solution / iodine solution (Fehling's / Benedict's Solns.) / droppers / labels / measuring cylinder (pipette) / white tile / balance (scales) / stopclock (timer)</p> <p>List of tasks: Identify any <i>four</i> tasks carried out in investigation: make up solutions / set (vary) temperature / mix solutions / take samples at time intervals / test samples (monitor) / record data / graph</p>	<p>(3)</p> <p>(3)</p> <p>(2 + 2 × 1)</p> <p>(5 × 1)</p> <p>(2 + 3 × 1)</p>

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 	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: label containers in water baths / set the temperature of water baths / repeat for different temperatures / make up solution of starch / make up solution of enzyme / measure starch solution into test tubes / add fixed amount of enzyme (solution) / add buffer / put containers in water bath / remove samples at time intervals / test with iodine (Benedict's / Fehling's) / starch solution only/ record data / graph</p> <p>Recorded Data / Observations: Identify any <i>two</i> points related to method used: Temperature // time taken for colour change [Table presentation likely]</p>	(2 + 3) (2 × 1 + 2 + 2 × 3) (2 + 3)
Analysis & Conclusions	Analysis <ul style="list-style-type: none"> ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s) 	20	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data or calculation or graph</p> <p>Limited manipulation of data (4) OR Good manipulation of data (7) OR Excellent manipulation of data (10)</p> <p>Conclusion: <i>One</i> relevant conclusion drawn or evaluation of results obtained</p> <p>Limited treatment (4) OR Good treatment (7) OR Excellent treatment (10)</p>	
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p><i>Two</i> 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</p> <p>Limited comprehension (1 + 1) OR Good comprehension (3 + 3) OR Excellent comprehension (5 + 5)</p>	

CHEMISTRY – Marking Criteria for Coursework B

		<u>Guide to mark assignment</u>	
Section	Aims	Total Mark	H.L.
			Qualitatively investigate the effectiveness of three methods of preventing an object containing iron from corrosion
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	<p>Statement / identification of problem / topic to be investigated: (3)</p> <p>Research: Any reference to book / internet (web) / person consulted etc (2)</p>
Preparation and planning	<p>Identification of variables and controls as required</p> <p>List of equipment needed for the investigation</p> <p>List of tasks to be carried out during the investigation</p>	20	<p>Variables / Controls : Identify any <i>five</i> variables and/or indicate how some of these need to be controlled or held fixed: <u>Essential Variables (fixed):</u> Coating (3) Time taken for corrosion to occur / amount of corrosion (3) <u>Other Variables:</u> Iron objects (fixed mass/size of object/exposed surface area) / same iron source samples (i.e. not different samples) / same conditions (temperature /exposure) / volume of coating (i.e. same treatments) / same containers / same amount of water / same time / Equipment needed: Identify any <i>five</i> pieces of equipment used: (5 × 1) iron objects / containers / coating materials (e.g. paints / desiccants etc.)/ plating arrangements / measuring cylinder / safety glasses / gloves /paintbrush / water / balance / labels</p> <p>List of tasks: Identify any <i>four</i> tasks carried out in investigation: (2 + 3 × 1) coating / exposing / monitor / control / record data / graph</p>

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 	20	<p>Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p>Procedure: State or Show Identify any <i>five</i> steps taken in conducting investigation: Procedure for coating × 3 (specify original treatment e.g. already galvanised) / equality of coating / same volume (measure) water / label / adding nails / set up control / set up in similar conditions (exposure/time) / describe monitoring process / repeat to verify / record data / graph</p> <p>Recorded Data / Observations: Identify any <i>two</i> points related to method used: indication of type of coating and corrosion occurring/effectiveness of prevention [Table presentation likely]</p>	(2 + 3) (2 × 1 + 2 + 2 × 3) (2 + 3)
Analysis & Conclusions	Analysis <ul style="list-style-type: none"> ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s) 	20	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data or calculation or graph</p> <p>Limited manipulation of data (4) OR Good manipulation of data (7) OR Excellent manipulation of data (10)</p> <p>Conclusion: <i>One</i> relevant conclusion drawn or evaluation of results obtained</p> <p>Limited treatment (4) OR Good treatment (7) OR Excellent treatment (10)</p>	(4) (7) (10)
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p>Two 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</p> <p>Limited comprehension (1 + 1) OR Good comprehension (3 + 3) OR Excellent comprehension (5 + 5)</p>	(1 + 1) (3 + 3) (5 + 5)

PHYSICS – Marking Criteria for Coursework B

		Guide to mark assignment	
Section	Aims	Total Mark	H.L.
			Investigate the relationship between the size of the electric current passing through a length of wire and its heating effect
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	<p>Statement / identification of problem / topic to be investigated:</p> <p>Research: Any reference to book / internet (web) / person consulted etc.</p>
Preparation and planning	<p>Identification of variables and controls as required</p> <p>List of equipment needed for the investigation</p> <p>List of tasks to be carried out during the investigation</p>	20	<p>Variables / Controls: Identify any <i>five</i> variables and/or indicate how some of these need to be controlled or held fixed: <u>Essential Variables:</u> Current (3) Temperature (3)</p> <p><u>Other Variables (fixed):</u> Voltage / same run time / length of wire (named wire) / diameter of wire / resistance of wire / metal of wire / volume (mass) of water / lagging (insulation) / container / same ammeter (multimeter) / same thermometer (temp. probe) (2 + 2 × 1)</p> <p>Equipment needed: Identify any <i>five</i> pieces of equipment used: calorimeter (container)/ thermometer (temp probe)/ ammeter (multimeter) / connecting wires/ water/ lagging (insulation)/ dc source (battery)/ rheostat (potentiometer) (variable resistor)/ balance (measuring cylinder)/ stop clock (stopwatch) (watch) (timer)/ wire (nichrome) (heating coil)(coil of wire) /switch (5 × 1)</p> <p>List of tasks: Identify any <i>four</i> tasks carried out in investigation; same volume of water / set current / measure (note) temperature change (rise) / repeat at different currents / record data / graph (2 + 3 × 1)</p>

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 	20	<p>Safety: Identify any <i>two specific</i> safety precaution followed in conducting the investigation</p> <p>Procedure: State or Show Identify any <i>five</i> steps taken in conducting investigation: measure (cut) one size pieces of wire / measure same volume of water / add water to calorimeter (container) / put lagging on calorimeter / measure initial temperature / set up circuit / keep current constant (adjust rheostat) / stir water / run for fixed time / measure final temperature / replace water for next 'run' / repeat to get averages / repeat using different current value / record data / graph</p> <p>Recorded Data / Observations: Identify any <i>two</i> points related to method used: temperature increase // for current value [Table presentation likely]</p>	<p>(2 + 3)</p> <p>(2 × 1 + 2 + 2 × 3)</p> <p>(2 + 3)</p>
Analysis & Conclusions	Analysis <ul style="list-style-type: none"> ▪ Calculations/data analysis ▪ Conclusion(s) and evaluation of results(s) 	20	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data or calculation or graph</p> <p>Limited manipulation of data (4) OR Good manipulation of data (7) OR Excellent manipulation of data (10)</p> <p>Conclusion: <i>One</i> relevant conclusion drawn or evaluation of results obtained</p> <p>Limited treatment (4) OR Good treatment (7) OR Excellent treatment (10)</p>	
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p><i>Two</i> 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</p> <p>Limited comprehension (1 + 1) OR Good comprehension (3 + 3) OR Excellent comprehension (5 + 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)	(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 <i>five</i> variables / controls: Must include two 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>three</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)	(2 × 4) (3 × 4) (5 × 2) (4 + 4 + 2)
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]	(2 × 3) (8 × 3) (2 × 5)
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	(7) } (10) } × 2 (7) } (10) } × 2
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	20	<i>Three</i> 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 + 10)