



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2013

Marking Scheme

Science

Higher Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

SCIENCE HIGHER LEVEL 2013

Summary of Marking Scheme

BIOLOGY

Question 1 (7 × 6 + 1 × 10)

Question 2 (a) (6), (15)
(b) (18)

Question 3 (a) (9), (9)
(b) (12)
(c) (6)
(d) (3)

CHEMISTRY

Question 4 (7 × 6 + 1 × 10)

Question 5 (a) (9), (9), (3)
(b) (12), (6)

Question 6 (a) (6), (9)
(b) (6), (6), (3), (9)

PHYSICS

Question 7 (7 × 6 + 1 × 10)

Question 8 (a) (6), (12), (3)
(b) (6), (6), (6)

Question 9 (a) (9), (6), (6), (6), (3)
(b) (3), (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 one from:** identical/ same/ same genes/ same chromosomes/ same DNA (6) [6]
- (b) (i) two (3)
(ii) **any one from:** biceps and triceps/ muscles moving lower arm up and down... (3) [6]
- (c) (i) **any one from:** collects (absorbs) more light/ can make more food/ more photosynthesis (3)
(ii) phototropism (3) [6]
- (d) sensory nerves to the CNS (brain) (spinal chord)/ from sensor (receptor) (3)
motor nerves from the CNS (brain) (spinal chord)/ to muscle (effector) (3) [6]
note: if the nerve type is not named in the candidate's answer use the order in the question
- (e) A tibia (3)
B fibula (3) [6]
note: allow (3) for reverse order
note: mixed spelling, e.g. 'tibula' gets no marks
- (f) **any two from:** producers make (produce) food/ make their own food
consumers eat (consume) food (animals) (plants)
decomposers breakdown (decompose) food (dead animals) (dead plants) (waste) (2 × 3) [6]
note: correct matching of name and role is essential
- (g) carbon dioxide + water (3)
glucose (starch) (sugar) + oxygen (3) [6]
accept: correct chemical equation for (2 × 3) as above
- (h) A transports sperm (semen) (2)
B releases sperm (semen)/ insemination/ sexual intercourse (2)
C produces sperm/ stores sperm/ produces hormones (testosterone) (2)
head contains nucleus (chromosomes) (genes) (gamete) (DNA)/ (2)
has acrosome (penetrates egg)/ fertilises egg (2)
tail movement (2) [10]

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

- (a) (i) What? breakdown of food (3)
- Why? so that the food can enter our bloodstream (be absorbed) (3)
- to make food soluble /releases (extracts) nutrients /get energy (3) [6]
- (ii) Give
- stomach: acid kills bacteria (disinfects)/ chemical digestion/
mixes food/ softens food/ produces enzymes/ stores (holds)
food/ produces acid (HCl)/ digestion of protein (3)
- liver: produces bile/ helps digest fats/ processes absorbed food/
storage/ breaks down alcohol (toxins)/ detoxify / produces urea (3)
- pancreas: produces enzymes/ helps chemical digestion/
regulates blood glucose/ insulin / hormones/ pancreatic juice (3)
- small intestine: completes digestion/ allows food into the blood
stream/ produces enzymes/ absorption/ absorbs food (3)
- large intestine: absorbs water/ produces faeces/ releases (solid)
waste/ vitamin production/ storage/ carries (transports) waste (3) [15]
- (b) Name **any two from:** A, B, C, D
- Give **note:** follow the letter in the candidates answers when awarding
marks for the name
- State **note:** the candidate may indicate the direction of blood flow on
on the diagram so treat this part as ‘Show or State’
- A pulmonary vein (3)
- into heart (from the lungs) (3)
- oxygenated (3)
- B aorta (3)
- out of heart (to the body) (3)
- oxygenated (3)
- C pulmonary artery (3)
- out of heart (to the lungs) (3)
- deoxygenated (3)
- D vena cava (3)
- into heart (from the body) (3)
- deoxygenated (3) [18]

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

- (a) (i) Identify **any two from:** burning fossil fuels/ deforestation/
oil spills/ careless spreading of slurry/ release of silage
effluent/ release of untreated sewage/ accidents releasing
radioactive materials/ pollution if qualified/ dumping if
qualified/ litter, unqualified... (2 × 3)
- note:** use reasonable judgement. This also applies to item (ii)
- Explain e.g. burning fossil fuels **any one from:** can cause acid
rain/ releases CO₂/ global warming/ climate change/
melting polar ice caps/ rising sea levels... (3) [9]
- note:** if human activity is too vague allow marks for a good
explanation. This also applies to item (ii)
- (ii) Identify **any two from:** reforestation/ nature reserves/ caring for
endangered species/ re-introduction of species/
elimination of disease causing organisms/ recycle/
renewable energy (**allow** (2 × 3) for any two named)/
reduce if qualified/ reuse if qualified... (2 × 3)
- Explain e.g. reforestation **any one from:** reduces CO₂/ provides
habits/ reduces (prevents) soil erosion/ reduces leaching
(mineral loss) from soil... (3) [9]
- (b) What? cell: unit of life/ building block of life/ smallest part of
an organism... (3)
- tissue: group of cells carrying out the same function/ group of
cells working together (3)
- organ: two or more tissues working together (3)
- system: two or more organs working together (3) [12]
- (c) Describe **any one from:** tar, nicotine, carbon monoxide.
- tar, organ: lung (3)
- effect: damages alveoli (air sacs)/ can cause cancer/ can
cause emphysema/ can cause coughing/ increases the risk
of lung infections/ may cause asthma /affects breathing/ clogs/
blocks... (3)
- carbon monoxide, organ: heart (3)
- note:** accept lung for (3) then effect gets zero
effect: heart has to work harder to supply oxygen/ strain
on heart/ reduces amount of oxygen in blood... (3)
- nicotine, organ: heart/ brain (3)
- note:** accept lung for (3) then effect gets zero
effect: heart beats faster/ brain becomes addicted (3) [6]
- (d) Name gas fired central heating/ bottled gas heaters/ paraffin
heaters/ stoves/ any named appliance that burns
fuel inside the house (3) [3]

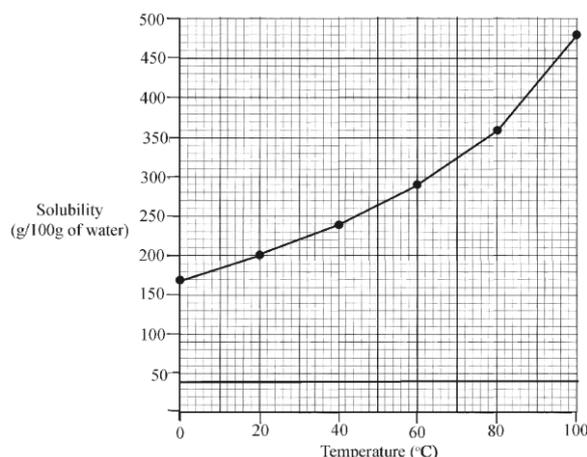
Chemistry (130 MARKS)
Answer each of the questions 4, 5 and 6.

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

- (a) (i) 0 to less than 7/ **accept:** less than 7/ 0 to 7 (3)
(ii) greater than 7 to 14/ **accept:** greater than 7/ 7 to 14 (3) [6]
- (b) (i) filtration (filter)/ decanting (decantation) (3)
(ii) evaporation/ distillation / boiling (3) [6]
- (c) (i) liquid/ gas (3)
(ii) gas (3) [6]
- (d) (i) electrolysis/ voltameter (spelt correctly) (3)
(ii) only water produced/ no CO₂ produced/ no harmful gases/ no pollution (3) [6]
- (e) (i) any named alkali metal; lithium, sodium, potassium... **accept:** correct symbol (3)
(ii) fizzes/ releases hydrogen/ makes the water alkaline/ catches fire/ explodes/
sparks/ floats... (3) [6]
allow: (3) for a correct item from list (ii) for any named metal in (i)
- (f) **any two from:** centre of atom/ contains most of mass/ very small (much smaller
than the atom)/ positive charge/ protons/ neutrons/ holds the electrons... (2 × 3) [6]
note: if protons and neutrons are on top line accept for (6)
- (g) can be broken down (3)
by decomposers/ named decomposer (3) [6]
allow: (6) for 'decomposes'/ 'rots'
- (h) (i) air (oxygen) **and** water (moisture) present (4)
(ii) no air (oxygen) (3)
(iii) no water (3) [10]

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

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



- (ii) Use Correct reading by candidate at 70⁰C +/-5 (3)
 Correct reading by candidate at 50⁰C +/-5 (3)
 Correct subtraction by candidate +/- 10 (3) [9]
note: if a graph is drawn and then used to estimate solubility consistent with that graph accept the results award (3 × 3) as above.

- As (iii) Draw graph drawn correctly (3) [3]

- (b) (i) Describe any suitable experiment involving the pouring (downward flow) of CO₂ and some indicator of that downward flow e.g. extinguishing a lighted candle/ turning lime water milky
- appropriate diagram with at least one item labelled (2 × 3)
note: if prep. of CO₂ is given showing the upward displacement of air in a correct diagram with at least one item labelled award (2 × 3)
- complete appropriate description of the experiment (2 × 3) [12]
note: prep. of CO₂ gets no marks here

- (ii) Explain CO₂ when poured (3)
 moves down through air (3) [6]
note: if prep. of CO₂ is given and the candidate refers to the upward displacement of air by CO₂ award (2 × 3)

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

- (a) (i) Distinguish **element:** made of one kind of atom/ all the atoms have the same atomic number/ can not be broken down/ simplest form of matter/ can not be separated by chemical means (3)
- compound:** made of two or more elements (different atoms) chemically combined/ can be separated by chemical means. (3) [6]
- (ii) Complete (1) for each correct entry.
note: three or more correct add (3) to the total mark
- | Property | Iron | Sulfur | Iron sulfide | | |
|---------------------|-------------|--------|--------------|---------|-----|
| Colour | Silver/grey | yellow | grey (black) | (6 × 1) | [9] |
| Attracted by Magnet | yes | no | no | + | |
| | | | | (3) | |
- (b) (i) Name **any two from:** sulfur dioxide/ sulfur trioxide/ nitrogen monoxide/ nitrogen dioxide (2 × 3) [6]
accept: correct chemical formulas
- (ii) Give **sulfur dioxide (trioxide):** burning fossil fuels/ volcanic eruptions
nitrogen (monoxide) dioxide: car/ car exhausts/ exhausts/ lightening (6) [6]
- note:** allow (6) for any correct source of a gas producing acid rain, as above, if name of gas is incorrect.
note: allow (6) for any correct source of carbon dioxide if it is the gas named e.g. burning fossil fuels/ respiration/ forest fires...
- (iii) How? part(s) of the sculpture would be eroded (worn away) (dissolved) / colour change/ blacken (3) [3]
- (iv) Write $\text{CaCO}_3 + \text{HCl}$ (3)
 $\text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ (3)
 Balanced: $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ (3) [9]
accept: correct equation for another acid

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) (i) radiation (3)
- (ii) solar array is safer, no risk of pollution/ nuclear reactors are less safe, they could release radioactive material(s) (radiation)/ nuclear reactors could become unstable (meltdown) (explode) (contaminate)... (3) [6]
- note:** reason must be matched with source, order of answering same as order in question
- (b) $5 \times 7 \times 20$ (3)
- 700 (3) [6]
- allow:** (6) for 700/ 7 alone
 (-3) for incorrect unit
- (c) high: dry/ settled/ little wind/ fine/ sunny/ fair (3)
- low: wet (rain)/ unsettled/ windy/ cloudy (3) [6]
- note:** hot and cold alone get no marks for high and low. If hot/ cold are qualified ignore hot/ cold and award marks e.g. high: 'hot and settled', low: 'cold and unsettled'
- (d) which?: 100 cm^3 / second/ greater volume (3)
- reason: greater volume (mass) (3) [6]
- (e) it conducts heat away/ conducts/ bad insulator/ cotton good insulator (6) [6]
- (f) it separates into colours/ spectrum/ rainbow (3)
- violet (3) [6]
- accept:** blue/ indigo/ UV/ purple for (3)
- (g) one magnetic field line correctly drawn (3)
- second magnetic field line correctly drawn (3) [6]
- allow:** (3) for two lines without correct arrows (without arrows)
- (h) (i) **any one from:** walking/ brakes/ using sand paper/ climbing/ playing football/ abseiling/ sharpening a knife/ grip... (3)
- (ii) **any one from:** car (cyclist) moving through air/ between moving parts of machinery in contact/ space capsule re-entering the atmosphere/ boat moving through water/ wear and tear... (3)
- (iii) lubrication/ smooth surfaces/ wheels/ castors /wet surface/ ball (roller) bearings... (2)
- (iv) **any one from:** streamlining/ smooth surface/ shape of vehicle/ spoilers (attachments to create a smooth air flow, reduce turbulence, drag)/ by decreasing the speed (slowing down)/ aerodynamic... (2) [10]
- allow:** (2) for an item from (iv) if it appears in (iii)

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

- (a) (i) Draw five points correctly plotted (6)
allow: (3) for three points correctly plotted
 straight line through, or close to, five points (3) [9]
- (ii) Describe proportional (6) [6]
allow: (6) one goes up so does the other at the same rate
- (iii) Use size: 1 (one) +/- 0.1 (3)
accept: a value correct for the candidate's graph
unit: Ω (Ohm) (3) [6]
- (iv) Enter A in meter symbol in series with R (3)
 V in meter symbol in parallel with R (3) [6]
- (v) How? variable resistor/ rheostat/ change the battery (power supply)/
 change resistance (not R) (3) [3]
- (b) (i) What? reflected sound/bounced (3) [3]

Calculate

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{500}{1.5} = 333 \text{ m s}^{-1}$$

award: (3) correct definition *or* (3) correct substitution (3)
 333 (3) [6]

allow: (6) for 333 alone

allow: (3) for $\frac{250}{1.5}$ *or* 166.6

BIOLOGY – Marking Criteria for Coursework B

Guide to mark assignment			
Section	Total Mark	Compare by means of investigation the vitamin C content of a number of commercial and fresh fruit juices.	H.L.
Introduction	5	1 (i) Statement / identification of problem / topic to be investigated:	(2)
		1 (ii) Research: Any reference to book / internet (web) / person consulted etc. / evidence of research	(3)
Preparation and planning	20	<p>2 (i) Variables / Controls : Identify <i>six</i> variables, the one compulsory variable and any five other variables, and/or indicate how some of these need to be controlled or held fixed.</p> <p>Compulsory Variable: Types of fruit juices</p> <p>Other Variables: Volume of fruit juice // <u>volume</u> of test reagent: DCPIP / starch and iodine / iodine & thiosulfate / fruit juice / vitamin C (Ascorbic acid) // vitamin C content // same treatment of juice // same concentration of test reagent (not vitamin C) // same method of adding test reagent e.g. droppers / burettes // same containers</p> <p>2 (ii) Equipment needed: Identify any <i>five</i> pieces of equipment used: Fruit juices // test reagent // water // vitamin C // containers // test tubes // test tube rack // droppers // syringes // mortar and pestle // graduated cylinder (burette / pipette) // fruit juicer // beakers // sieve (filter paper and funnel) // dimpled tile // stirrer // Any valid piece of equipment pertinent to procedure (except safety equipment)</p> <p>2 (iii) List of tasks: Identify any four tasks carried out in investigation: Procure fruit juices (fruit) // process (make) fruit juices // get (make) test reagent // fixed volume of test reagent or juice // add juice to test reagent in container or test reagent to juice // measure amount of solution added // record data</p>	<p>(3)</p> <p>(1 + 1 + 1 + 2 + 2)</p> <p>(5 × 1)</p> <p>(1 + 1 + 1 + 2)</p>

Procedure	20	<p>3 (i) Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation.</p> <p>3 (ii) & (iii) Procedure: <u>State or Show</u> Note: no marks for repeat items already awarded marks in tasks. Note: deduct 3 marks if a candidate uses mixed methodologies.</p> <p>Identify any <i>five</i> steps taken in conducting investigation: Obtain commercial juice(s) // obtain fruit(s) // make fresh fruit juice(s) // make (get) test reagent // label test tubes (containers) // measure volume of test reagent <i>or</i> juice // place test reagent <i>or</i> juice into containers // add vitamin C to test reagent // add juice <i>or</i> test reagent // stir // note amount of test reagent <i>or</i> juice added for colour change // repeat for other juices // repeat for accuracy // record data // graph (present data)</p> <p>3 (iv) Recorded Data / Observations: [Table presentation likely] Identify any <i>two</i> points related to method used:</p> <p>1 commercial juice and Vitamin C content</p> <p>1 fresh juice and Vitamin C content</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	Compare by means of investigation methanol, propan-1-ol and candle wax in terms of their effectiveness as fuels.	H.L.
Introduction	5	1 (i) Statement / identification of problem / topic to be investigated:	(2)
		1 (ii) Research: Any reference to book / internet (web) / person consulted etc. / evidence of research	(3)
Preparation and planning	20	2 (i) Variables / Controls : Identify <i>six</i> variables, the one compulsory variable and any five other variables , and/or indicate how some of these need to be controlled or held fixed.	
		Compulsory Variable: Type of fuel	(3)
		Other Variables: Rise in temperature // mass (volume) of fuel consumed // time taken for fuel to burn out // fixed mass (volume) of water // fixed period of time // same (area of base of) calorimeter (container) // distance of fuel container to calorimeter // methods of burning fuels // same thermometer (temperature sensor) // container open or covered // same type of wick // fixed starting temperature (of water) // same room temperature	(1 + 1 + 1 + 2 + 2)
		2 (ii) Equipment needed: Identify any <i>five</i> pieces of equipment used: Fuels // spirit burner // matches (lighter) // thermometer (temperature sensor) // calorimeter (container) // cover for container // water // timer // graduated cylinder (pipette) // retort stand (clamps) // balance // Any valid piece of equipment pertinent to procedure (except safety equipment)	(5 × 1)
		2 (iii) List of tasks: Identify any <i>four</i> tasks carried out in investigation: Prepare fuels // measure volume of water // pour water into calorimeter (container) // burn fuel // measure initial and final temperature // measure initial and final mass // measure time for fuel to burn // record data // reference to calculation	(1 + 1 + 1 + 2)

<p>Procedure</p>	<p>20</p>	<p>3 (i) Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p>3 (ii) & 3 (iii) Procedure: <u>State or Show</u> Note: no marks for repeat items already awarded marks in tasks.</p> <p>Identify any <i>five</i> steps taken in conducting investigation: Measure volume of water // place water in calorimeter (container) // fix calorimeter (container) in position // place methanol in spirit burner // find initial mass of methanol in spirit burner (container) <i>or</i> burner with fuel // place thermometer (temperature sensor) in water // measure initial temperature of water // light the wick / heat water // burn for set period of time // stir water as it heats // extinguish the flame // measure final temperature of water // measure time taken for fuel to burn out // measure final mass of methanol in spirit burner // repeat for propan-1-ol // repeat for candle wax // repeat for accuracy // calculate average // record data // present data (table, graph)</p> <p>3 (iv) Recorded Data / Observations: [Table presentation likely]</p> <p>Methanol and result Propan-1-ol and result Candle wax and result</p> <p>[Result linked to method used e.g. temperature change / mass used / time taken]</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2 + 3 + 3)</p> <p>(1 + 2 + 2)</p>
<p>Analysis & Conclusions</p>	<p>20</p>	<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 Good manipulation of data Excellent manipulation of data</p> <p>Conclusion: <i>One</i> relevant conclusion drawn and evaluation of results obtained</p> <p>Limited treatment Good treatment Excellent treatment</p>	<p>(4) (7) (10)</p> <p>(4) (7) (10)</p>
<p>Comment</p>	<p>10</p>	<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 Good comprehension Excellent comprehension</p>	<p>(2 × 1) (2 × 3) (2 × 5)</p>

<p>Procedure</p>	<p>20</p>	<p>3 (i) Safety: Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p>3 (ii) & (iii) Procedure: State or Show Note: no marks for repeat items already awarded marks in tasks. Identify any <i>five</i> steps taken in conducting investigation: Position solar cell (panel) // attach meter // set up light source // set factor 1 // method of varying factor 1 // measure output // set factor 2 // method of varying factor 2 // repeat for accuracy // calculate average // record data // graph (present data) Note: Factors 1 and 2 may be taken from the following list: Size (exposed area) of solar cell (panel) // type of solar cell (panel) // distance from light source // angle of tilt of solar cell // angle of tilt of light source // coloured light filters // light intensity (bulb wattage) // type of light source</p> <p>3 (iv) Recorded Data / Observations: [Table presentation likely] Identify any <i>two</i> points related to method used:</p> <p>Factor 1 <i>versus</i> output from solar cell (panel)</p> <p>Factor 2 <i>versus</i> output from solar cell (panel)</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2 + 3 + 3)</p> <p>(2 + 3)</p>
<p>Analysis & Conclusions</p>	<p>20</p>	<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>
<p>Comment</p>	<p>10</p>	<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>

OWN INVESTIGATION – Marking Criteria for Coursework B

Section	Total Mark	Guide to mark assignment	H.L.
Introduction	10	<p>1 (i) Statement / identification of problem / hypothesis statement / topic to be investigated: Limited treatment Good treatment Excellent treatment</p> <p>1 (ii) Research: Any <i>two</i> references to book / website / person consulted etc. (must qualify why this person was a suitable consultant) / evidence of research</p>	<p>(2) (4) (6)</p> <p>(2 × 2)</p>
Preparation and planning	40	<p>2 (i) Variables & Controls*: Identify any <i>seven</i> variables / controls: Must include two essential variables with respect to title. Any five other relevant variables / control</p> <p>2 (ii) Equipment needed: Identify any <i>eight</i> pieces of equipment used</p> <p>2 (iii) List of tasks: Identify any <i>five</i> tasks carried out in investigation * If variables/controls not relevant to the type of investigation undertaken allow 9 marks for stating so, then readjust equipment to (8 × 2) and tasks to (5 × 3)</p>	<p>(2 + 3) (5 × 3)</p> <p>(6 × 1 + 2 + 2)</p> <p>(5 × 2)</p>
Procedure	40	<p>3 (i) Safety: Identify any <i>three</i> safety precautions followed in conducting the investigation</p> <p>3 (ii) & (iii) Procedure: State <u>or</u> Show Note: no marks for repeat items already awarded marks in tasks. Identify any <i>ten</i> steps taken in conducting investigation</p> <p>3 (iv) Recorded Data / Observations: Identify any <i>three</i> points related to method used [Table presentation likely]</p>	<p>(3 × 3)</p> <p>(10 × 2)</p> <p>(3 + 4 + 4)</p>
Analysis & Conclusions	40	<p>4 (i) Calculations / Data analysis: <i>Two</i> relevant comments analysing data or calculation or graph Limited manipulation of data OR Good manipulation of data OR Excellent manipulation of data</p> <p>4 (ii) Conclusion: <i>Two</i> relevant conclusions drawn or evaluation of results obtained Limited treatment OR Good treatment OR Excellent treatment</p>	<p>(4) } (7) } × 2 (10) }</p> <p>(4) } (7) } × 2 (10) }</p>
Comments	20	<p>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</p> <p>Limited comprehension</p> <p>Good comprehension</p> <p>Excellent comprehension</p>	<p>(4 × 1)</p> <p>(4 × 3)</p> <p>(4 × 5)</p>