



**Coimisiún na Scrúduithe Stáit**  
**State Examinations Commission**

**Junior Certificate 2011**

**Marking Scheme**

**Science**

**Higher Level**

SCIENCE HIGHER LEVEL 2011

Summary of Marking Scheme

**BIOLOGY**

Question 1		$(7 \times 6 + 1 \times 10)$
Question 2	(a)	(6), (6), (3), (3)
	(b)	(6), (3), (12)
Question 3	(a)	(3), (3), (3), (6), (3)
	(b)	(3), (3), (3), (6), (6)

**CHEMISTRY**

Question 4		$(7 \times 6 + 1 \times 10)$
Question 5	(a)	(9), (6), (3)
	(b)	(6), (6)
	(c)	(3), (3), (3)
Question 6	(a)	(3), (3), (6), (9)
	(b)	(6), (3), (3), (9)

**PHYSICS**

Question 7		$(7 \times 6 + 1 \times 10)$
Question 8	(a)	(3), (3), (3), (6), (3)
	(b)	(3), (3), (3), (9), (3)
Question 9	(a)	(9), (3), (6), (6)
	(b)	(3), (6), (3), (3)

**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) (i) **any one from:** eggs, beans, peas, lentils, nuts,... (3)  
(ii) eat less foods from level from **A**/ eat more foods from level from **E** (3) [6]
- (b) water (3)  
glucose (3) [6]  
**accept:** starch/ sugar/ named sugar for 'glucose'
- (c) **A:** testa/ seed coat (3)  
**B:** endosperm/ food **allow** (3) for cotyledon (3) [6]
- (d) allows light into the eye/ transparent/ refracts light/ focuses light/ protection (3)  
controls thickness (shape) of lens/ adjusts focus of lens (3) [6]
- (e) **A:** membrane (3)  
**B:** chromosomes/ genes/ DNA (3) [6]
- (f) **A:** incisor (3)  
**B:** chewing/ crushing/ grinding (3) [6]
- (g) slug/ snail/ mussel/ bee/ wasp/ fly/ spider/ starfish/ prawn... (3)  
fish/ lizard/ snake/ dog/ cat/ bird/ frog/ newt/ toad/ bat/ whale... (3) [6]
- (h) (i) **any two methods explained from the list , 3 marks each:**  
**accept:**  
composting: decay of waste  
incineration: burning  
landfill: dumped in municipal (managed) site (2 × 3)  
recycling: material is reused

**(ii) advantage and disadvantage 2 marks each:**

Method	Advantage	Disadvantage
Composting	releases minerals/ makes humus/ reduces volume of waste/ less landfill/ environmentally friendly ...	can be smelly/ wood lice, worms, flies... live in and or on compost/ can attract vermin/ unsightly...
Incineration	reduces volume of waste/ valuable source of heat/ heat can be used to make electricity/ less landfill/ lower transport costs ...	fear of release of dangerous materials into the air...
Landfill	easy, wastes not sorted/ wastes not processed environmentally unfriendly/...	can be smelly, can attract vermin/ poisonous substances may be released/ risk of fire/ water/ air pollution...
Recycling	materials re-used/ less landfill/ salvage of valuable substances/ reuse of some items producing different materials/ environmentally friendly ...	materials such as paper pulp can only be recycled a few times/ can be more expensive than using new materials/ plastics difficult...

(2 × 2) [10]

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

- (a) (i) Name      **A:** aorta (3)  
                         **B:** vena cava (3)      **[6]**  
                         **accept:** artery for **A**, but not pulmonary. **accept:** vein for **B**, but not pulmonary
- (ii) Describe      **any two from:** carbon dioxide (CO<sub>2</sub>) removed (less CO<sub>2</sub>)/ oxygen (O<sub>2</sub>) added (more O<sub>2</sub>) / water (H<sub>2</sub>O) vapour removed (2 × 3)      **[6]**  
                         thin walls/ walls one cell thick (3)      **[3]**  
                         What?
- (iii) Name      right ventricle (3)      **[3]**
- (b) (i) Give      **any two from:** food passes from mother to baby/ oxygen passes from mother to baby/ wastes (CO<sub>2</sub>, urea...) pass from baby to mother/ antibodies pass from mother to baby/ produces hormones (progesterone)/ water passes from mother to baby ... (2 × 3)      **[6]**  
                         **accept:** provides food, O<sub>2</sub>, H<sub>2</sub>O and antibodies. Removes wastes or named waste
- (ii) What?      **any one from:** carry nutrients or named nutrients to baby/ carry wastes from baby / transport... (3)      **[3]**
- (iii) Describe      **any four from:** uterus contracts/ baby is moved to cervix/ .cervix opens (dilates)/ amniotic sac breaks (the waters break)/ baby is pushed out/ umbilical cord is tied and cut/ the afterbirth (placenta and umbilical cord) is expelled/ breasts produce milk/ breast milk contains food and antibodies/ bonding between mother and baby... (4 × 3)      **[12]**

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

(a) (i) <u>What?</u>	transpiration	(3)	[3]
(ii) <u>Comment</u>	steady/ even/ low/ little change... <b>accept:</b> uses little water/ slow	(3)	[3]
(iii) <u>Comment</u>	increases/ rises/ greater <b>accept:</b> uses more water/ fast	(3)	[3]
(iv) <u>What</u>	moving air (wind)	(3)	
	temperature/ hotter	(3)	[6]
(v) <u>Name</u>	xylem	(3)	[3]
(b) (i) <u>Write</u>	<b>any three organisms linked in the diagram starting with a green plant</b> e.g. green plant (grass), rabbit, fox	(3)	[3]
(ii) <u>What?</u>	dead animals/ dead plants/ animal excretions/ fallen leaves/ humus...	(3)	[3]
(iii) <u>Give</u>	<b>any adaptation linked to the diagram:</b> <i>fur</i> on fox (rabbit) (mouse), <i>wings</i> on butterfly (owl) (thrush), <i>hind legs</i> on grasshopper, leaves on green plant...	(3)	[3]
(iv) <u>Name</u>	<b>any two animals linked in the diagram:</b> e.g. owl and fox could compete for prey	(2 × 3)	[6]
(v) <u>What?</u>	living things (organisms) depend on each other <b>accept:</b> animals (plants) depend on each other  <b>any two way relationship between organisms.</b>  e.g. butterflies pollinate and get food from the flowers/ birds eat fruit and disperse seeds/ animals make CO <sub>2</sub> which is used by plants, plants make O <sub>2</sub> which is used by animals...	(3)	[6]

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

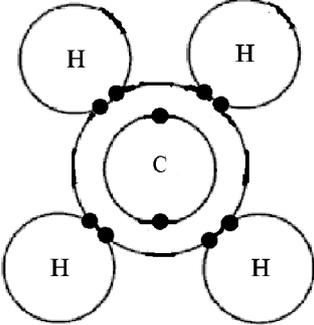
**Question 4. (52 marks) All items, (a), (b), (c), etc. (7 × 6 + 1 × 10marks)**

- (a) alkali metals (3)  
**any one from:** very reactive/ react with air / react with water/ produce hydrogen with water/ produce an alkaline solution when they react with water/ catch fire on water/ burn with coloured flame/ form ionic compounds/ one electron in outer shell... (3) [6]
- (b) pH paper/ universal indicator/ pH meter (3)  
 read pH from (coloured) scale/ match with (coloured) scale/ read meter (3) [6]
- (c) same atomic number/ same number of protons/ same element (3)  
 different mass numbers/ different numbers of neutrons/ different mass matched (3) [6]
- (d) **any one from:** water/ air/ oxygen (3)  
**any one from:** coating with zinc (galvanising)/ painting/ greasing/ coating with tin (tin plating)/ use of ‘sacrificial’ metal e.g. magnesium... (3) [6]
- (e) dissolve (add) copper sulfate (solute)/ evaporate (3)  
 no more copper sulfate (solute) will dissolve (3) [6]
- (f) **any two from:** CaCl<sub>2</sub>/ H<sub>2</sub>O/ CO<sub>2</sub> (2 × 3) [6]  
**note** formulae(as) *only* accepted
- (g) manganese dioxide (manganese (IV) oxide MnO<sub>2</sub>/ amylase (3)  
 decomposition of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>)/ preparation of O<sub>2</sub>/ starch matched (3) [6]
- (h) **any two from:** degrades slowly/ burning plastic can release toxic fumes/ large amounts of chemical pollutants are produced by the manufacture of plastics/ large amounts of fossil fuels are use to make plastics/ plastic waste is unsightly in the environment/ expensive to dispose of... (2 × 2)  
**accept:** more CO<sub>2</sub> in air (green house effect)/ animals eat plastic
- non-biodegradable any one from:** will *not* break down/ won't break down for many years/ can't be broken down by the organisms present on earth/ they do not occur in nature/ will not rot... (3)
- any one from:** made from renewable materials/ no fossil fuels used/ sustainable/ less greenhouse gas(CO<sub>2</sub>) emissions (reduction in carbon footprint)/ environmentally ‘friendly’/ less hazardous wastes produced in production/ can be composted/... (3) [10]

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

- (a) (i) What? water (3)  
Give anhydrous (white) copper sulphate/ blue cobalt chloride (3)  
**accept:** anhydrous cobalt chloride/ cobalt chloride paper  
**matched with:** turns blue/ turns pink/ (3) [9]
- accept a correct physical property and its correct value:**  
density (3), 1 g/cm<sup>3</sup> (3)/ mp (3), 0 °C (3)/ bp (3), 100 °C (3)
- (ii) Identify limewater (3)  
State carbon dioxide/ CO<sub>2</sub> (3) [6]
- (iii) Name natural gas/ methane/ coal/ turf (peat)... (3) [3]
- (b) (i) Distinguish **elements:** only one kind of atom/ can not be decomposed/  
simplest form of matter (3)  
**compounds:** two or more kinds of atom (elements) chemically  
combined/ can be decomposed (3) [6]
- (ii) Name metals (3)  
non-metals (3) [6]
- (c) (i) Why? magnesium combined chemically (reacted)/ compound  
formed... (3) [3]
- (ii) Where? air/ oxygen... (3) [3]
- (iii) Give magnesium oxide/ MgO (3) [3]

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

- (a) (i) What? two or more atoms combined chemically/ smallest particle of a substance /smallest particle that can exist on its own/ single atom, if it is an inert gas (3) [3]
- (ii) What? covalent (3) [3]
- (iii) Draw diagram as shown 6 marks  
allow 3 marks for showing the four bonds as dashes (lines) (6) *or* (3) [6]
- 
- (iv) Describe positive and negative ions (3)  
Name attract each other (3)  
**accept** any two from the list: electron loss/ electron gain/ electron transfer/ ionic bond/ Na<sup>+</sup> and Cl<sup>-</sup>/ attract for (2 × 3) marks  
**name of an ionic compound** e.g. sodium chloride (3) [9]
- (b) (i) Describe shake water with soap solution (flakes) (3)  
**any one from:** hard water needs a lot of soap solution to form a lather (forms a scum)/ soft water only needs a small volume of soap solution to form a lather (no scum) (3)  
*or* (3)  
shake with soap (3)  
compare lather/ amount of soap (3) [6]  
*or* (3)  
**allow:** water with soap solution (flakes) *or* water with soap for (3) marks (3)
- (ii) Name compound of calcium (magnesium)/ correctly named compound of calcium (magnesium) e.g. calcium (magnesium) hydrogen carbonate/ calcium (magnesium) chloride/ calcium (magnesium) sulphate/ calcium (magnesium) ions... (3)  
**as written, also accept** any named compound of calcium (magnesium) (3) [3]
- (iii) Would? soft (3)  
Justify ion-exchanger removes hardness (calcium, magnesium) (3)
- How? shake water with soap solution (flakes) (3)  
What? small amount needed to get to get a lather/ water is soft (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)**

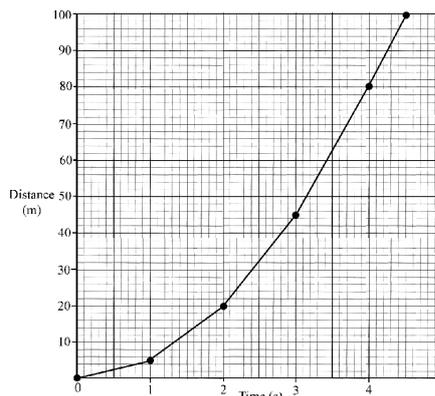
- (a) magnetic field (3)  
 suspend magnet, one end points north/ end that repels north pole of compass  
 needle/ end that repels north pole of another magnet... (3) [6]  
**accept:** 'compass' alone for (3)
- (b) (i) A (3)  
 (ii) C (3) [6]
- (c) resistance to movement of one surface over another/ force that opposes motion (3)  
**any one from:** smooth surfaces/ lubricant/ named lubricant/ choice of materials... (3) [6]
- (d) **any two from:** light/ heat/ photosynthesis / food/ bio fuels/ wind/ waves/ fossil  
 fuels/ light to electricity/ rain for hydropower... (2 × 3) [6]
- (e) density decreases/ air expands/ balloon 'floats'/ air outside denser/ air outside  
 colder... (6) [6]
- (f) speaker emits sound (3)  
 table tennis (pith) ball suspended by thread moves (3) [6]  
**note:** alternative experiments are acceptable
- (g) like charges (3)  
 repel (3)
- or**  
**accept:** static (3), electricity (3) [6]
- (h) gravity (2)  
 force per unit area/  $\frac{force}{area}$  **accept:**  $\frac{weight}{area}$  **or** weight per unit area (3)  
 Pa **or**  $N/m^2$  **or**  $Nm^{-2}$  **accept:** any correct unit of pressure (2)  
 less air above/ less weight of air/ air exerts lower force... (3) [10]

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

(a)	(i) <u>What?</u>	reflection	(3)	[3]
	(ii) <u>What?</u>	refraction	(3)	[3]
	(iii) <u>What?</u>	dispersion	(3)	[3]
	(iv) <u>Give</u>	<b>A</b> red	(3)	
		<b>B</b> violet <b>accept</b> blue/ indigo	(3)	[6]
		<b>accept reverse order for</b> (3)		
	(v) <u>Name</u>	rainbow/ dispersion of sunlight by water in the atmosphere	(3)	[3]
(b)	(i) <u>Why?</u>	less electricity (current) (energy) used/ less fossil fuel burned	(3)	[3]
	(ii) <u>Name</u>	heat	(3)	[3]
	(iii) <u>Which?</u>	light	(3)	[3]
	(iv) <u>Calculate</u>	<u>CFL</u> $0.02 \times 100 \times 15 = 30$ cent		
		<u>other bulb</u> $0.115 \times 100 \times 15 = 172.5$ cent = €1.725	(3 × 3)	[9]
		<b>allow</b> (3) for the correct 'formula' once, then (3) for each correct calculation. Accept 'cent' or '€'. deduct one mark for each arithmetical slip. <b>assume</b> 'cent' if no monetary unit it is given except for '1.725' where the euro symbol is required. <b>note:</b> both correct answers given but no calculation shown award (3 × 3). One correct answer given but no calculation shown award (2 × 3). <b>note:</b> wrong numerical answer with no evidence of calculation gets no marks. €172.5 and €30 merit only (2) each.		
	(v) <u>Name</u>	fridge/ cooker/ TV/ computer...	(3)	[3]

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

- (a) (i) Draw six points plotted correctly  
**allow (3)** for 3 – 5 points plotted correctly  
 curved line through the six points



- (ii) Use 60 m + *or* -4 m (3) [3]
- (iii) Calculate  $\frac{80 - 20}{2} = 30$  (3)  
 m/s... (3) [6]
- (iv) Is? no (3)  
 curved graph/ graph not straight line/ stone accelerating... (3) [6]
- (b) (i) What? temperature of water in **A** decreases (water in **A** gets colder) and  
 temperature of water in **B** increases (water in **B** gets hotter) (3) [3]
- (ii) Explain copper conducts (transfers) (3)  
 heat (3) [6]
- (iii) What? thermometer/ temperature probe (3) [3]
- (iv) Name **any one from:** wood/ plastic/ named plastic e.g. nylon... (3) [3]

## BIOLOGY – Marking Criteria for Coursework B

<u>Guide to mark assignment</u>			
Section	Aims	Total Mark	H.L.
			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.
<b>Introduction</b>	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><b>1 (i) Statement / identification of problem / topic to be investigated:</b></p> <p><b>1 (ii) Research:</b> Any reference to book / internet (web) / person consulted etc.</p>
<b>Preparation and planning</b>	<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><b>2 (i) Variables / Controls :</b> 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.</p> <p><b>Measurable quantities:</b> temperature // time// carbon dioxide production // density <b>OR</b> [If stated: variables/controls not relevant to investigation <b>allow 5marks</b>]</p> <p><b>2 (ii) Equipment needed:</b> Identify any <b>five</b> pieces of equipment used:</p> <p>Water // Oil // Glucose (sugar) // Yeast // Beakers // Thermometer (temp. sensor) // Water bath (hotplate) // balance // Hydrometer // thermos flask (tin foil + cotton wool) // Retort stand // Data logger // Carbon dioxide sensor // Bungs // Timer (stopwatch) // Any valid piece of equipment pertinent to procedure (except safety equipment)</p> <p><b>2 (iii) List of tasks:</b> Identify <b>one task pertinent to each experiment</b> and any other <b>three</b> tasks carried out in investigations:</p> <p>Monitor temperature // monitor carbon dioxide evolution // monitor density of solution // monitor time</p> <p>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)</p>
			(2)
			(3)
			(1 + 1 + 1 + 2)
			(5 × 1)
			(1 + 2 + 2)
			(1 + 2 + 2)

<b>Procedure</b>	Procedure, apparatus, safety, data collection / observations <ul style="list-style-type: none"> <li>▪ Safety precautions required for this investigation</li> <li>▪ Procedures followed in the investigation</li> <li>▪ Recorded data/observations</li> </ul>	20	<p><b>3 (i) Safety:</b> Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p><b>3 (ii) &amp; (iii) Procedure: <u>State or Show</u></b>          Identify any <i>six</i> steps taken in conducting these investigations, <u>three steps common to the 3 experiments and one step pertinent to each experiment.</u></p> <p><b>Common Steps:</b>          Prepare sugar solution // prepare yeast solution // mix in container //create anaerobic conditions // plug opening // start timer// record data // present data (table, graph)</p> <p><i>(i) Temperature and time:</i> mix in vacuum flask(lagged container)// thermometer(probe) in // record temperature at regular intervals</p> <p><i>(ii) Carbon dioxide and time:</i> set up for measurement of CO<sub>2</sub> (e.g. CO<sub>2</sub> sensor, pressure sensor, gas syringe, balance) // maintain suitable temperature // note measurements of CO<sub>2</sub> at regular intervals</p> <p><i>(iii) Density and time:</i> 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)</p> <p><b>3 (iv) Recorded Data / Observations:</b>  <b>Temperature versus time</b>  <b>Carbon dioxide versus time</b>  <b>Density versus time</b> [Table presentation likely]</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2)</p> <p>(3 × 2)</p> <p>(1 + 2 + 2)</p>
<b>Analysis &amp; Conclusions</b>	Analysis <ul style="list-style-type: none"> <li>▪ Calculations / data analysis</li> <li>▪ Conclusion(s) and evaluation of results(s)</li> </ul>	20	<p><b>4 (i) Calculations / Data analysis:</b>  <i>One</i> relevant comment analysing data <b>or</b> calculation <b>or</b> graph          Limited manipulation of data <b>OR</b>          Good manipulation of data <b>OR</b>          Excellent manipulation of data</p> <p><b>4 (ii) Conclusion:</b> <i>One</i> relevant conclusion drawn <b>or</b> evaluation of results obtained          Limited treatment <b>OR</b>          Good treatment <b>OR</b>          Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
<b>Comment</b>	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p><b>5 One</b> comment on <b>refinement / extension / source of error</b>          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 <b>OR</b>          Good comprehension <b>OR</b>          Excellent comprehension</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p>



<b>Procedure</b>	Procedure, apparatus, safety, data collection/observations <ul style="list-style-type: none"> <li>▪ Safety precautions required for this investigation</li> <li>▪ Procedures followed in the investigation</li> <li>▪ Recorded data/observations</li> </ul>	20	<p><b>3 (i) Safety:</b> Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p><b>3 (ii) &amp; 3 (iii) Procedure: <u>State or Show</u></b>          Identify any <i>five</i> 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)</p> <p><b>3 (iv) Recorded Data / Observations:</b>  <b>Acid 1 versus pH</b>  <b>Acid 2 versus pH</b>          [Table presentation likely]</p>	<p>(2 + 3)</p> <p>(1 + 1 +2 +3 +3)</p> <p>(2 + 3)</p>
<b>Analysis &amp; Conclusions</b>	Analysis <ul style="list-style-type: none"> <li>▪ Calculations/data analysis</li> <li>▪ Conclusion(s) and evaluation of results(s)</li> </ul>	20	<p><b>4 (i) Calculations / Data analysis:</b>  <i>One</i> relevant comment analysing data or calculation or graph          Limited manipulation of data  <b>OR</b>          Good manipulation of data  <b>OR</b>          Excellent manipulation of data</p> <p><b>4 (ii) Conclusion:</b>  <i>One</i> relevant conclusion drawn or evaluation of results obtained          Limited treatment  <b>OR</b>          Good treatment  <b>OR</b>          Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
<b>Comment</b>	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p><b>5 One</b> comment on <b>refinement / extension / source of error</b>          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  <b>OR</b>          Good comprehension  <b>OR</b>          Excellent comprehension</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p>



<b>Procedure</b>	Procedure, apparatus, safety, data collection/observations <ul style="list-style-type: none"> <li>▪ Safety precautions required for this investigation</li> <li>▪ Procedures followed in the investigation</li> <li>▪ Recorded data/observations</li> </ul>	20	<p><b>3 (i) Safety:</b> Identify any <i>two specific</i> safety precautions followed in conducting the investigation</p> <p><b>3 (ii) &amp; (iii) Procedure: <u>State or Show</u></b>          Identify any <i>five</i> 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 <i>or</i> 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)</p> <p><b>3 (iv) Recorded Data / Observations:</b>  <b>Factor 1 versus force</b>  <b>Factor 2 versus force</b>          [Table presentation likely]</p>	<p>(2 + 3)</p> <p>(1 + 1 + 2 + 3 + 3)</p> <p>(2)</p> <p>(3)</p>
<b>Analysis &amp; Conclusions</b>	Analysis <ul style="list-style-type: none"> <li>▪ Calculations/data analysis</li> <li>▪ Conclusion(s) and evaluation of results(s)</li> </ul>	20	<p><b>4 (i) Calculations / Data analysis:</b>  <i>One</i> relevant comment analysing data <b>or</b> calculation <b>or</b> graph</p> <p>Limited manipulation of data  <b>OR</b>          Good manipulation of data  <b>OR</b>          Excellent manipulation of data</p> <p><b>4 (ii) Conclusion: <i>One</i> relevant conclusion drawn <b>or</b> evaluation of results obtained</b></p> <p>Limited treatment  <b>OR</b>          Good treatment  <b>OR</b>          Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
<b>Comment</b>	Comments (e.g. refinements, extensions, sources of error etc.)	10	<p><b>5 <i>One</i> comment on <b>refinement / extension / source of error</b></b>          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  <b>OR</b>          Good comprehension  <b>OR</b>          Excellent comprehension</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p>

## OWN INVESTIGATION – Marking Criteria for Coursework B

Guide to mark assignment				
Section	Aims	Total Mark	H.L.	
<b>Introduction</b>	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	<b>1 (i) Statement / identification of problem / hypothesis statement / topic to be investigated:</b> (must elaborate on title) <b>1 (ii) Research:</b> Any <i>two</i> references to book / web / person consulted etc (must qualify why this person was a suitable consultant)	(6) (2 × 2)
<b>Preparation and planning</b>	Identification of variables and controls List of equipment needed for the investigation List of tasks to be carried out during the investigation	40	<b>2 (i) Variables &amp; Controls*:</b> Identify any <i>five</i> variables / controls: Must include <b>two</b> essential variables with respect to title. Any <b>three</b> other relevant variables <b>2 (ii) Equipment needed:</b> Identify any <i>five</i> pieces of equipment used <b>2 (iii) List of tasks:</b> 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)  (2 + 4 + 4)
<b>Procedure</b>	Procedure, apparatus, safety, data collection/observations <ul style="list-style-type: none"> <li>▪ Safety precautions required for this investigation</li> <li>▪ Procedures followed in the investigation</li> <li>▪ Recorded data/observations</li> </ul>	40	<b>3 (i) Safety:</b> Identify any <i>two</i> safety precautions followed in conducting the investigation <b>3 (ii) &amp; (iii) Procedure:</b> State <u>or</u> Show Identify any <i>eight</i> steps taken in conducting investigation <b>3 (iv) Recorded Data / Observations:</b> Identify any <i>two</i> points related to method used [Table presentation likely]	(2 × 3)  (8 × 3)  (2 × 5)
<b>Analysis &amp; Conclusions</b>	Analysis <ul style="list-style-type: none"> <li>▪ Calculations/data analysis</li> <li>▪ Conclusion(s) and evaluation of results(s)</li> </ul>	40	<b>4 (i) Calculations / Data analysis:</b> <i>Two</i> relevant comments analysing data <b>or</b> calculation <b>or</b> graph Limited manipulation of data <b>OR</b> Good manipulation of data <b>4 (ii) Conclusion:</b> <i>Two</i> relevant conclusions drawn <b>or</b> evaluation of results obtained Limited treatment <b>OR</b> Good treatment	(7) } (10) } × 2  (7) } (10) } × 2
<b>Comment</b>	Comments (e.g. refinements, extensions, sources of error etc.)	20	<b>5 Three</b> comments on <b>refinements / extensions / sources of error</b> 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)