



Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE 2010

MARKING SCHEME

SCIENCE

ORDINARY LEVEL

Introduction

General Points regarding the Marking Scheme for Junior Certificate Science

1. In many cases only key phrases are given in the marking schemes. These points contain the information and ideas that must appear in the candidate's answer in order to merit the assigned marks.
2. The descriptions, methods and definitions given in a marking scheme are not exhaustive and alternative valid answers are acceptable.
3. The detail required in any answer is determined by the context and the manner in which the question is asked and by the number of marks assigned to the answer in the examination paper. This may vary from year to year.
4. The word(s) / phrase(s) used in the scheme indicate the essential points required in the candidate's answer. A double solidus (//) separates points for which separate marks are allocated in a part of the question. Words, expressions or statements separated by a solidus (/) are alternatives which are equally acceptable for a particular point. A word or phrase given in brackets is an acceptable alternative to the preceding word or phrase. Note, however, that words, expressions or phrases must be correctly used in context and not contradicted. Where there is evidence of incorrect use or contradiction, the marks may not be awarded.
5. In general, names and formulas of elements and compounds are equally acceptable except in cases where either the name or the formula is specifically asked for in the question. However, in some cases where the name is asked for, the formula may be accepted as an alternative. This is clarified within the scheme.
6. There is a deduction of one mark for each arithmetical slip made by a candidate in a calculation. If the incorrect calculated value is used 'correctly' in a subsequent calculation the marks may be awarded for the subsequent calculation.
7. **Cancelled & / or Repeated Answers**
 - (a) In the case of short-answer questions, if an answer is cancelled and a second answer given, the cancellation is accepted and marks are awarded for the uncanceled answer.
 - (b) If two answers are given and neither answer is cancelled, the first answer offered only is accepted and marked accordingly.
 - (c) If the only answer offered is cancelled, the cancelling is ignored and the answer marked as normal. However, in MCQ-type questions cancelling of an incorrect and correct answer applies.
8. For answers to "describe an investigation / an experiment", multiple attempts will be dealt with as follows:

If a candidate answers a question or part of a question once only and then cancels, the cancelling is ignored and the answer marked as normal. If a candidate answers a question or part of a question more than once and then cancels one attempt, the cancelling will be ignored and all the answers, whether cancelled or not, marked as normal. However, only the marks gained in respect to the highest scoring attempt will be counted. Points cannot be "mixed and matched from two attempts". The disallowed marks should be enclosed in square brackets.
9. Where a candidate has received a modified examination paper under the reasonable accommodations arrangements the marking scheme applied has been modified accordingly.

TABLE FOR ASSIGNING GRADES	
GRADE	RANGE
A	510 - 600
B	420 - 509
C	330 - 419
D	240 - 329
E	150 - 239
F	60 - 149
NG	0 - 59

Junior Certificate Examination

SCIENCE

Ordinary 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 ticked (✓) mandatory biology investigations/experiments claimed on page 5. Note this number in the box on page 5 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of ticked (✓) mandatory chemistry investigations/experiments claimed on page 6. Note this number in the box on page 6 of the Coursework booklet and enter it in the Coursework A grid on the cover page.

Count the number of ticked mandatory (✓) physics investigations/experiments claimed on page 7. Note this number in the box 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.

COURSEWORK A & B

Transfer total marks awarded for Coursework A and Coursework B to grid on the cover page of the examination answer-booklet.

SCIENCE ORDINARY LEVEL 2010
Summary of Marking Scheme

BIOLOGY

Question 1 (7 × 6 + 1 × 10)

Question 2 (a) (3), (3), (3)
(b) (2 × 3), (2 × 3)
(c) (6 + 4 × 3)

Question 3 (a) (6 + 2 × 3)
(b) (2 × 3), (3 × 3)
(c) (2 × 3), (6)

CHEMISTRY

Question 4 (7 × 6 + 1 × 10)

Question 5 (a) (6 + 3)
(b) (4 × 3), (6)
(c) (4 × 3)

Question 6 (a) (2 × 3), (3), (3)
(b) (2 × 3), (3)
(c) (2 × 3)
(d) (4 × 3)

PHYSICS

Question 7 (7 × 6 + 1 × 10)

Question 8 (a) (4 × 3)
(b) (6 + 2 × 3)
(c) (3 × 3)
(d) (2 × 3)

Question 9 (a) (i) (12) (ii)-(iv) (3 × 3) (v) (6)
(b) (4 × 3)

BIOLOGY

Question 1

- (a) (Cell) Wall [accept membrane] (3)
Nucleus (3)
- (b) Oxygen (3)
Water (3)
- (c) Coloured petals / flower becomes coloured (3)
Water travels up (through the flower stem) (3)
- (d) Glucose / reducing sugar / named reducing sugar (e.g. fructose, maltose, galactose) (3)
Energy (3)
- (e) Stomach (3)
Reabsorbing water / stores (moves) waste (faeces) / egestion (3)
- (f) Amylase (3)
Maltose (3)
- (g) Urine / water / salt / urea (3)
Carbon dioxide / water (vapour) (3)
- (h) B (3)
A (3)
C (4)

Question 2

- (a) (i) **A:** Stamen
- (ii) **B:** Petal
- (iii) **F:** Attract insects
- | |
|-----|
| B |
| --- |
| A |
| |
| F |
| --- |
| --- |
- (3 × 3)

- (b) (i) Name: Pooter
- Use: Capture insects (small animals) (2 × 3)
- (ii) Name: Quadrat
- Use: Count (measure) plants (sedentary animals) (2 × 3)
[Allow beating tray and matched use]

- (c) (i) Photosynthesis
- (ii) Oxygen
- (iii) Chlorophyll
- (iv) Alcohol
- (v) Starch present / it was making starch / photosynthesis occurred
- *(6 + 4 × 3)

Question 3

- (a) (i) White cells
- (ii) Red corpuscles (cells)
- (iii) Platelets *(6 + 2 × 3)
-
- (b) (i) **A:** Windpipe / trachea
- B:** Lung (2 × 3)
- (ii) Keep air tubes open / stops collapse [accept “supports”]
- (iii) Alveolus / alveoli / air sac(s)
- (iv) (Exhaled air) contains carbon dioxide (3 × 3)
-
- (c) (i) Increase
- (ii) Decrease [accept “stays the same”] (2 × 3)
- (iii) Healthy diet (or qualified example) / no smoking / weight control /
avoid stress / regular health checks (6)

CHEMISTRY

Question 4

- (a) Funnel / filter paper (3)
A / filter paper / funnel (3)
- (b) Proton (3)
Electron (3)
- (c) S: Ice
Melting

S

 (2 × 3)
- (d) Vinegar (3)
Baking soda (3)
- (e) Sodium chloride / NaCl (3)
Burette (3)
- (f) Shiny (3)
Can be stretched (3)
- (g) Bronze / solder (3)
Ornaments / medals / any valid use / electronic circuits / fixing connections /
any valid use (3)
[Matched use]
- (h) A (3)
Prevent air (oxygen) entering (3)
Painting (varnishing) / oiling (greasing) / coating / galvanising (4)

Question 5

(a) Hydrogen

Burns with a pop

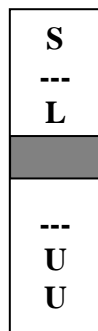
*(6 + 3)

(b) (i) Manganese dioxide

Hydrogen peroxide

Respiration

Combustion



(ii) Turns blue (purple)

*(6 + 4 × 3)

(c) Water

(3)

Bunsen burner / heating mantle / hotplate

(3)

Allow to cool / seeding / scratching beaker with glass rod

(3)

Beaker / evaporating basin / clock glass / stirrer (glass rod) /
(any valid piece of equipment)

(3)

Question 6

(a) (i) Hydrogen / H
Oxygen / O (2 × 3)

(ii) (Anhydrous) Copper sulphate // cobalt chloride (3)

White to blue // blue to pink (3)
[Matched colour change]

(b) (i) Calcium / magnesium (3)

Ion exchange / softener / washing soda (3)
[Allow Boiling / heating /distillation]

(ii) B (3)

(c) Chlorine / ozone
Screening (2 × 3)

(d) **State or show** (4 × 3)

Vinegar in beaker / container / spot vinegar on tile / put some in test tube //

Add universal indicator / dip in pH paper / pH probe //

Compare to chart / take reading //

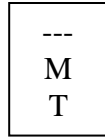
Relevant labelled diagram [diagram must include at least one label]

[Marks awarded in context of valid experiment]

PHYSICS

Question 7

(a) kg (3)
s (3)



(b) Traffic cone (3)
Has no fulcrum / no pivotal point / doesn't rotate about a point (3)

(c) Pressure increases with height / it is higher up (closer) to the tank in attic (6)

(d) Orange (3)
Green (3)

(e) Energy (3)
Echo (3)

(f) Repel / push away (3)
(Like poles) repel (3)

(g) Expands / increases (3)
Bubbles (3)

(h)

Force (F)

Area (A)

 / force ÷ area / (F ÷ A) (3)

3 (3)

Barometer (4)

Question 8

- (a) Kettle [accept radio] /
(Battery powered) radio [accept kettle] /
(Battery powered) radio /
Bunsen burner [accept radio] (12)
- (b) (i) Ball expanded / increased in volume
(ii) Cool the ball / stated cooling method
(iii) (Metals) expand when heated / contract when cooled *(6 + 2 × 3)
- (c) (i) Light / lamp (3)
(ii) Nothing / darkness / card (3)
(iii) Light travels in straight lines (3)
- (d) Ray reflected appropriately (3)
Periscope (3)

Question 9

- (a) (i) Correct line on its own /
5 points correctly plotted and join plotted points (12)

Award 2 marks for each correct point plotted

Award 2 marks for joining plotted points

- (ii) 0.7 ± 0.02 / correct figure from candidate's graph (3)
- (iii) Voltmeter / multimeter (3)
- (iv) Rheostat / variable resistor / potentiometer / power supply (3)
- (v) Proportional / both increase at same rate (6)
[Current increases with voltage (i.e. no indication of proportionality – 3 marks only)]

- (b) Use less current (energy) / last longer / cheap / more efficient (3)
- Yes (3)
- Forward bias / or explained (3)
- Protect the LED / limit current flowing through LED (3)

BIOLOGY – Marking Criteria for Coursework B

Section	Aims	Total Mark	<u>Guide to mark assignment</u>	O.L.
			Qualitatively investigate two factors that affect the uptake of water by a plant.	
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	Statement / identification of problem / topic to be investigated:	(3)
			Research: Any reference to book / internet (web) / person consulted etc.	(2)
Preparation and planning	Identification of variables and controls as required	20	Variables / Controls : Identify four variables, the two essential variables that are going to be examined and any two other variables, and/or indication of how some of these need to be controlled or held fixed: <u>Possible Essential Variables:</u> Temperature // Sunlight // Wind (air movement) // Humidity // Leaf area // Time // Uptake of water	(3 + 3)
			<u>Other Variables:</u> Identical Plants // Same (sized) plants // Same availability of water // Plant type // Leaf type // Set up control	(2 + 2)
			Equipment needed: Identify any four pieces of equipment used: Water // Oil // Plants // Light // Fridge // Oven // Heater // Thermometer // Test tubes // Beakers // Fan (hair dryer) // Hygrometer // Clock // Growing medium (soil) // Balance // Measuring tape (metre stick) // Cling film to cover soil // Light meter // Any valid piece of equipment pertinent to procedure	(2 + 1 + 1 + 1)
			List of tasks: Identify any three tasks carried out in investigation: Procure plant(s) // put plant in water // Set (vary) factor 1 // Set (vary) factor 2 // Allow time for water uptake // Measure (monitor) uptake of water // Record data // Graph (or otherwise present)	(2 + 2 + 1)
	List of equipment needed for the investigation			
	List of tasks to be carried out during the investigation			

<p>Procedure</p>	<p>Procedure, apparatus, safety, data collection / observations</p> <ul style="list-style-type: none"> ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations 	<p>20</p>	<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: <u>Light:</u> Add same amount of water to each tube // Insert plant (with root) well below water- line // Add a layer of oil // Place plant e.g. on window sill // Leave for a time // Estimate uptake of water // Record data // Graph (present) // Repeat with another plant placing it in a much darker place // <u>And/or Temperature:</u> Repeat as above at different temperatures. <u>And/or Wind:</u> Repeat as above using fan at different distances (speeds) from plant <u>And/or Other variable:</u> Humidity // Time // Leaf area // Recorded Data / Observations: Identify any <i>two</i> points related to method used: Water uptake & variable 1 Water uptake & variable 2 [Table presentation likely]</p>	<p>(3 +2)</p> <p>(3 + 3 + 2 + 1 + 1)</p> <p>(3)</p> <p>(2)</p>
<p>Analysis & Conclusions</p>	<p>Analysis</p> <ul style="list-style-type: none"> ▪ Calculations / data analysis ▪ Conclusion(s) and evaluation of results(s) 	<p>20</p>	<p>Calculations / Data analysis: <i>One</i> relevant comment analysing data or calculation or graph Limited manipulation of data OR Good manipulation of data OR Excellent manipulation of data</p> <p>Conclusion: <i>One</i> relevant conclusion drawn or evaluation of results obtained Limited treatment OR Good treatment OR 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>Comments (e.g. refinements, extensions, sources of error etc.)</p>	<p>10</p>	<p><i>One</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 OR Good comprehension OR Excellent comprehension</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p>

CHEMISTRY – Marking Criteria for Coursework B

<u>Guide to mark assignment</u>				
Section	Aims	Total Mark	Compare by way of investigation the abilities of different indigestion remedies to neutralise excess stomach acid.	O.L.
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	<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 four variables, the two essential variables and any two other variables, and/or indicate how some of these need to be controlled or held fixed: <u>Essential Variables:</u> Indigestion remedies // pH of mixture // Volume of acid // Mass (dose /volume) of remedy <u>Other Variables:</u> Amount of indigestion remedy // Concentration of (stomach) acid (HCl) // Amount of (stomach) acid (HCl) // Temperature //same indicator (pH probe) Time over which reaction was let run</p> <p>Equipment needed: Identify any four pieces of equipment used:</p> <p>Indigestion remedies // (Deionised) (distilled) water // (0.15 M) HCl // Beakers (flasks) (Test tubes) // pH meter (paper) (universal indicator solution) // Stirrer (Glass rods) // Graduated cylinder (burette) (pipette) // Any valid piece of equipment pertinent to procedure</p> <p>List of tasks: Identify any three tasks carried out in investigation: Procure indigestion remedies // Prepare remedy for use (e.g. crush, measure) // Set (vary) remedy 1 <i>versus</i> acid // Set (vary) remedy 2 <i>versus</i> acid // Mix remedy and acid // Set or record time // Measure (monitor) acid used <i>or</i> pH <i>or</i> amount of remedy // Record data // Graph (or otherwise present)</p>	<p>(3 + 3)</p> <p>(2 + 2)</p> <p>(2 + 1 + 1 + 1)</p> <p>(2 + 2 + 1)</p>

<p>Procedure</p>	<p>Procedure, apparatus, safety, data collection/observations</p> <ul style="list-style-type: none"> ▪ Safety precautions required for this investigation ▪ Procedures followed in the investigation ▪ Recorded data/observations 	<p>20</p>	<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>pH method: Measure same amount of HCl solution // Measure pH (add same amount of universal indicator solution) // prepare remedy // Add indigestion remedy // Allow react for same period of time <i>or</i> monitor pH <i>against</i> time // Measure pH again // Repeat to verify // Repeat with other remedy // Record data // Graph (present)</p> <p>Titration method: Add HCl to burette // Make suspension of (prepare) remedy in (titration) flask // Put dose of remedy in (titration) flask // Add indicator to remedy mix // Add acid in small quantities // Allow time for reaction to occur // When colour change persists (acid persists) note volume of acid added // Repeat to verify (average results) // Repeat with other remedy // Record data // Graph (present)</p> <p>Fixed acid method: Measure fixed amount of acid // Add indicator // Prepare remedy // Add remedy in small quantities until colour changes // Note amount of remedy added // Repeat to verify (average results) // Repeat with other remedy // Record data // Graph (present)</p> <p>Recorded Data / Observations: Identify any <i>two</i> points related to method used: Type of indigestion remedy and pH <i>or</i> Type of indigestion remedy and amount of acid <i>or</i> Type of indigestion remedy and amount of remedy Repeated for second remedy [Table presentation likely]</p>	<p>(3 + 2)</p> <p>(3 + 3 + 2 + 1 + 1)</p> <p>(3)</p> <p>(2)</p>
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Analysis & Conclusions	<p>Analysis</p> <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 Limited manipulation of data OR Good manipulation of data OR Excellent manipulation of data</p> <p>Conclusion: <i>One</i> relevant conclusion drawn or evaluation of results obtained Limited treatment OR Good treatment OR Excellent treatment</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p> <p>(4)</p> <p>(7)</p> <p>(10)</p>
Comment	<p>Comments (e.g. refinements, extensions, sources of error etc.)</p>	10	<p><i>One</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 OR Good comprehension OR Excellent comprehension</p>	<p>(4)</p> <p>(7)</p> <p>(10)</p>

PHYSICS – Marking Criteria for Coursework B

			Guide to mark assignment	
Section	Aims	Total Mark	Investigate two factors that affect the distance taken for a toy car to stop after rolling down a ramp.	O.L.
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	5	<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 <i>four</i> variables, the two essential variables and any two other variables, and/or indicate how some of these need to be controlled or held fixed: <u>Possible Variables:</u> Distance travelled before stopping // Elevation (vertical height) (slope) (angle) of ramp // Surface(s) on which the toy car rolls after the ramps // Length of ramp // Same ramp // Starting position on ramp // Toy car (i.e. use same one or identical ones) // friction // K.E. (velocity) of car leaving ramp // Mass of toy car // Shape of car (air resistance)</p> <p>Equipment needed: Identify any <i>four</i> pieces of equipment used: Toy car(s) // Ramp // Balance // Oil // Meter stick (tape measure) // Retorts (or other mechanism to elevate ramp) // Different rolling surfaces // Any valid piece of equipment pertinent to procedure</p> <p>List of tasks: Identify any <i>three</i> tasks carried out in investigation: Procure toy car // Set up ramp // Set (vary) factor 1 // Set (vary) factor 2 // Choose start position // Clean rolling surface of anything that might interfere with result (dirt or grit) // Release car // Measure distance travelled // Record data // Graph (present)</p>	<p>(3 + 3 + 2 + 2)</p> <p>(2 + 1 + 1 + 1)</p> <p>(2 + 2 + 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: <u>State or Show</u> Identify any <i>five</i> steps taken in conducting investigation: Set up ramp // Vary heights (angles) (surfaces) (length of ramp) (starting position on ramp) (mass of car) (air resistance) // Clean rolling surface of anything that might interfere with result (dirt or grit) // Mark start position on ramp// Release car from fixed point on ramp// Measure distance travelled// Repeat to verify // Repeat for factor 2 // Record data // Graph (present)</p> <p>Recorded Data / Observations: Identify any <i>two</i> points related to method used: Factor 1 versus distance travelled (3) Factor 2 versus distance travelled (2) [Table presentation likely]</p>	(3 + 2) (3 + 3 + 2 + 1 + 1)
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>One</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 (4) OR Good comprehension (7) OR Excellent comprehension (10)</p>	

OWN INVESTIGATION – Marking Criteria for Coursework B

Guide to mark assignment				
Section	Aims		Total Mark	O.L.
Introduction	Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.	10	Statement / identification of problem / hypothesis statement / topic to be investigated: (must elaborate on title) Research: Any <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>four</i> variables / controls: Must include two essential variables with respect to title. Any two 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 × 6) (2 × 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 OR Good OR Excellent manipulation of data Conclusion: <i>Two</i> relevant conclusions drawn and evaluation of results obtained Limited treatment OR Good treatment OR Excellent treatment	(4) } (7) } × 2 (10) (4) } (7) } × 2 (10)
Comment	Comments (e.g. refinements, extensions, sources of error etc.)	20	Four comments on refinements / extensions / sources of error e.g. What was learnt* / reliability of data / how process could be improved / sources of error / extension of investigation / possible reason for unexpected result * Other than conclusions already stated	(5 + 5 + 5 + 5)

