Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Cycle 2022

Marking Scheme

Science

Common 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.

Guidelines for Examiners

1. In many cases only key phrases are given in the marking scheme. 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. Words, expressions or statements separated by a solidus (/) are alternatives which are equally acceptable for a particular point. Note, however, that words, expressions or phrases must be correctly used in context. A double solidus (//) separates points for which separate marks are allocated in a part of the question.

4. 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 uncancelled answer.

b. If more than the required number of uncancelled answers are given, surplus incorrect answers nullify the marks awarded for correct answers.

c. If the only answer offered is cancelled, the cancelling is ignored and the answer marked as normal.

5. Recording a mark of zero and recording "No Response" (NR)

A zero should only be recorded when the candidate has attempted the question but does not merit marks.

If a candidate does not attempt a question (or part of) examiners should record NR.

6. Application of the marking scheme

Apply the marking scheme as agreed in all cases.

7. Electronic annotation of responses

Annotations should allow your Advising Examiner to understand the mark you awarded. Examiners are expected to annotate parts of the responses as directed at the marking conference. (See **JC Science 2022 – Annotations** on page 5.)

8. Bonus for Irish

Bonus marks at the rate of 10% of the marks obtained in S26T will be given to a candidate who answers S26T entirely through Irish and who obtains 75% or less of the total mark available in S26T (i.e. 270 marks or less). In calculating the bonus to be applied decimals are always rounded down, not up e.g., 4.5 becomes 4; 4.9 becomes 4, etc. See below for when a candidate is awarded more than 270 marks in S26T.

Marcanna Breise as ucht freagairt trí Ghaeilge – JC Science 2022

Léiríonn an tábla thíos an méid marcanna breise ba chóir a bhronnadh ar iarrthóirí a ghnóthaíonn níos mó ná 75% d'iomlán na marcanna.

Ba chóir marcanna de réir an ghnáthráta a bhronnadh ar iarrthóirí nach ngnóthaíonn níos mó ná 75% d'iomlán na marcanna don scrúdú. Ba chóir freisin an marc bónais sin **a shlánú síos**.

Tábla 360 @ 10%

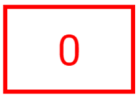
Bain úsáid as an tábla seo i gcás na n-ábhar a bhfuil 360 marc san iomlán ag gabháil leo agus inarb é 10% gnáthráta an bhónais.

Bain úsáid as an ngnáthráta i gcás 270 marc agus faoina bhun sin. Os cionn an mharc sin, féach an tábla thíos.

Bunmharc	Marc Bónais
271 - 273	26
274 - 276	25
277 - 280	24
281 - 283	23
284 - 286	22
287 - 290	21
291 - 293	20
294 - 296	19
297 - 300	18
301 - 303	17
304 - 306	16
307 - 310	15
311 - 313	14
314 - 316	13

Bunmharc	Marc Bónais
317 – 320	12
321 – 323	11
324 – 326	10
327 – 330	9
331 – 333	8
334 – 336	7
337 – 340	6
341 – 343	5
344 – 346	4
347 – 350	3
351 – 353	2
354 – 356	1
357 – 360	0

Annotations used in online marking Junior Cycle Science 2022

Annotation	Meaning
	'n' marks awarded; e.g. 1 – 12
	No marks awarded. Answer incorrect or insufficient.
	Used to annotate a blank page; e.g. pages 13 & 26
	Cancellation
	Incorrect
	Seen

Section A

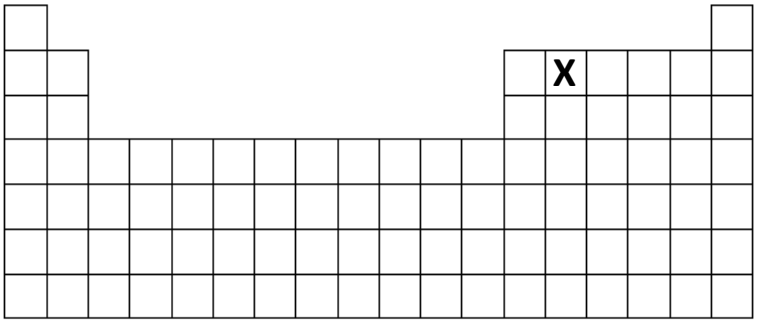
Q1		Marks

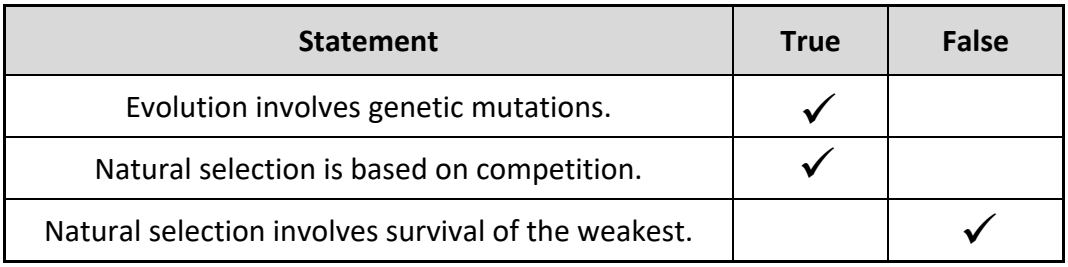
Physical Quantity	*Instrument*	
Volume	**Graduated cylinder**	**9**
Time	**Stopwatch**	**1**
Temperature	**Thermometer**	**1**
Resistance	**Ohmmeter**	**1**
Potential difference	**Voltmeter**	**3**

Q2		Marks
(a)		

Description	*Name of celestial object*	
Consists of burning gas	**Star**	**3**
Orbits a planet	**Moon**	**3**
Orbits a star	**Planet**	**3**

(b)	Star	**3**
(c)	*Labelled diagram:* 	**3**

Q3		Marks
(a)	Proton / neutron / nucleon	**3**
(b)	Negative	**3**
(c)	X in position of carbon 	**3**
(d)	Centre diagram identified  *Justify*: carbon or element X has a valency of 4/ carbon or element X has combining power of 4 / carbon or element X has 4 valence electrons/ carbon or element X has 4 electrons in its outer shell/ correct electron configuration for carbon [2,4]/ carbon or element X needs 4 electrons	**5 + 1**

Q4		Marks
(a)		
(b)	Named adaptation or feature **and** how it helps the organism survive	**3**
(c)	Named adaptation or feature **and** how it helps the organism survive	**3**

Statement	True	False	
Evolution involves genetic mutations.	✓		**7**
Natural selection is based on competition.	✓		**1**
Natural selection involves survival of the weakest.		✓	**1**

Q5		Marks
(a)	Oxygen / O_2 / O	**3**
(b)	Density	**3**
(c)	0.3 or 3/10	**3**
(d)	Add more water (solvent) // increase the temperature	**5 + 1**

Q6		Marks
(a)	Image 4	**3**
(b)	Image 1	**3**
(c)	1 month	**3**
(d)	Reflects light	**3**
(e)	The Moon has a smaller mass than Earth	**3**

Q7		Marks
(a)	0.15 Unit: m/s or ms^{-1}	**5 + 1**
(b)	Any valid hypothesis	**3**
(c)	Same trolley or same mass of trolley / same track or same length of track or same surface of track / start trolley in same position / same starting force exerted on trolley / same friction or same air resistance ***Any one***	**3**
(d)	Graph matching hypothesis	**3**

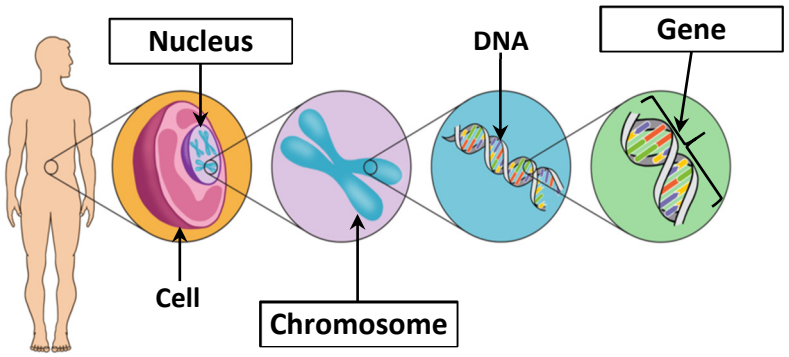
Q8		Marks
(a)	Big Bang (theory)	**1**
	Evidence: Expansion of universe or galaxies (red shift) // cosmic or background radiation // ratio or presence of hydrogen and helium in gas clouds in distant galaxies ***Any two***	**1+1**
(b)	Correct benefit Correct hazard	**6** **6**

Q9		Marks
(a)	T	**1**
(b)	Any valid safety precaution	**6**
(c)	13	**6**
(d)	7	**1**
(e)	NaOH (sodium hydroxide) / KOH (potassium hydroxide) / $Ca(OH)_2$ (calcium hydroxide), etc.	**1**

<table>
<tr><th>Q10</th><th></th><th>Marks</th></tr>
<tr><td>(a)</td><td>
<table>
<tr><th>Statement</th><th>True</th><th>False</th></tr>
<tr><td>The blood in vessel C is deoxygenated.</td><td></td><td>✓</td></tr>
<tr><td>The organs found at location A are part of the respiratory system.</td><td>✓</td><td></td></tr>
<tr><td>Carbon dioxide leaves the blood at location B.</td><td></td><td>✓</td></tr>
<tr><td>Vessel D is a vein.</td><td>✓</td><td></td></tr>
</table>
</td><td>9
1
1
1</td></tr>
<tr><td>(b)</td><td>Blood under greater or higher pressure</td><td>3</td></tr>
</table>

Section B

Q11		Marks
(a)	Position C	**3**
(b)	A *Justify:* tilted towards the Sun	**3** **3**
(c)	Position B and/or Position D	**3**
(d)	The tilted Earth moves around the Sun	**3**
(e)	Metre stick / ruler / measuring tape / trundle wheel	**3**
(f)	Length or height of pole / depth of insertion of pole into the ground / angle of insertion / time of day / aspect / slope of surface	**3**
(g)	A Valid explanation	**3** **3**
(h)	Correct curve	**3**

Q12		Marks
(a)		3 3 3
(b)	Microscope	3
(c)	23	3
(d)	46	3
(e)(i)	Bb bb	3+3
(e)(ii)	50%	3
(e)(iii)	100%	3

Q13		Marks
(a)	Temperature at which a solid changes to a liquid	**3** **3**
(b)	Physical // No new substance produced or formed/can be reversed	**3** **3**
(c)	Aluminium is less dense or zinc is more dense	**3**
(d)	Aluminium is a better conductor of heat than zinc	**3**
(e)	Sugar has a lower melting point or metals have a higher melting point	**3**
(f)	Poor electrical conductor or good electrical insulator // poor conductor of heat or good heat insulator // low melting points // low boiling points // non-lustrous or dull or does not reflect light // soft // brittle // liquid or gas at room temperature ***Any two***	**3+3**
(g)	*Labelled diagram of circuit:* Any **three** correct symbols from buzzer or bulb or wire(s) or battery Bulb or buzzer in series with battery Circuit completed correctly with battery and bulb/buzzer in series with the sucrose solution	**3(1)** **3** **3**
(h)	Description - reference to evaporation or distillation Labelled diagram of appropriate method Indication of location of sucrose at end of valid experiment	**3** **3** **3**

<table>
<tr><th>Q14</th><th></th><th>Marks</th></tr>
<tr><td>(a)</td><td>To make Europe climate neutral or valid aim from text</td><td>3</td></tr>
<tr><td>(b)</td><td>Drought / floods / forest fires / new pests or any other valid natural phenomenon</td><td>3</td></tr>
<tr><td>(c)(i)</td><td>Methane (CH_4) / carbon dioxide (CO_2) / Nitrous oxide (N_2O)</td><td>3</td></tr>
<tr><td>(c)(ii)</td><td>Initiative linked to named gas</td><td>3</td></tr>
<tr><td>(d)</td><td>Any valid suggestion</td><td>3</td></tr>
<tr><td>(e)</td><td>Same mass or grams / 80 g of each</td><td>3</td></tr>
<tr><td>(f)</td><td>B
Less sugar // less fat // less cholesterol // less sodium // more protein Any two</td><td>3
3+3</td></tr>
<tr><td>(g)</td><td>15</td><td>3</td></tr>
<tr><td>(h)(i)</td><td>Circle drawn around mouth on diagram</td><td>3</td></tr>
<tr><td>(h)(ii)</td><td>Oesophagus</td><td>3</td></tr>
<tr><td>(h)(iii)</td><td>
<table>
<tr><th>Function</th><th>Part of digestive system</th></tr>
<tr><td>Absorbs water from fully-digested matter</td><td>Large intestine</td></tr>
<tr><td>Secretes hydrochloric acid to kill bacteria in food</td><td>Stomach</td></tr>
<tr><td>Absorbs fully-digested food into the bloodstream</td><td>Small intestine</td></tr>
</table>
</td><td>3
3
3</td></tr>
</table>

Q15		Marks
(a)(i)	Position 1 and/or Position 3	**3**
(a)(ii)	Position 1	**3**
(b)	Gravity	**6**
(c)	Friction / respiration	**3**
(d)	*Graph*: **Spring P** – 8 points plotted correctly (8 x 1) **Spring P** – correct line drawn through all 8 plotted points **Spring Q** - 8 points plotted correctly (8 x 1) **Spring Q** – correct line drawn through all 8 plotted points **Legend** (either line correctly labelled)	 **8** **2** **8** **2** **1**
(e)	Two valid conclusions	**3 + 3**
(f)	13.5	**6**
(g)	Mass – amount of matter / quantity of matter Weight – force acting on an object due to gravity / force of gravity on an object	**3** **3**
(h)	P Justify	**3** **3**

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