

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**JUNE 2021**

**LIFE SCIENCES  
MARKING GUIDELINE  
(EXEMPLAR)**

**MARKS: 150**

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This marking guideline consists of 10 pages.

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**PRINCIPLES RELATED TO MARKING LIFE SCIENCES**

1. **If more information than marks allocated is given.**  
Stop marking when maximum mark is reached and put a wavy line and 'max' in the right-hand margin.
2. **If, for example, three reasons are required and five are given.**  
Mark the first three irrespective of whether all or some are correct/ incorrect.
3. **If whole process is given when only a part of it is required.**  
Read all and credit the relevant part.
4. **If comparisons are asked for, and descriptions are given.**  
Accept if the differences/similarities are clear.
5. **If tabulation is required but paragraphs are given.**  
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required.**  
Candidates will lose marks.
7. **If flow charts are given instead of descriptions.**  
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense.**  
Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.
9. **Non-recognised abbreviations.**  
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.
10. **Wrong numbering.**  
If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.
11. **If language used changes the intended meaning.**  
Do not accept.
12. **Spelling errors.**  
If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names are given in terminology.**  
Accept, provided it was accepted at the national memo discussion meeting.
14. **If only the letter is asked for, but only the name is given (and vice versa).**  
Do not credit.

15. **If units are not given in measurements.**  
Candidates will lose marks. Marking guideline will allocate marks for units separately.
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**
17. **Caption**  
All illustrations (diagrams, graphs, tables, etc.) must have a caption.
18. **Code-switching of official languages (terms and concepts)**  
A single word or two that appear(s) in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

**SECTION A****QUESTION 1**

- 1.1 1.1.1 A ✓✓
- 1.1.2 D ✓✓
- 1.1.3 A ✓✓
- 1.1.4 B ✓✓
- 1.1.5 C ✓✓
- 1.1.6 B ✓✓
- 1.1.7 C ✓✓
- 1.1.8 C ✓✓
- 1.1.9 D ✓✓ (9 x 2) (18)
- 1.2 1.2.1 Blastocyst ✓
- 1.2.2 Internal ✓fertilisation
- 1.2.3 Peptide ✓bonds
- 1.2.4 Umbilical vein ✓
- 1.2.5 Gene ✓
- 1.2.6 Grommets ✓
- 1.2.7 Chromatin network ✓ (7 x 1) (7)
- 1.3 1.3.1 B only ✓✓
- 1.3.2 B only ✓✓
- 1.3.3 Both A and B ✓✓ (3 x 2) (6)
- 1.4 1.4.1 (a) PpLI ✓✓ (2)
- (b) PpII ✓✓ (1)
- 1.4.2 25% ✓✓ (2)

- |     |       |     |                                      |     |
|-----|-------|-----|--------------------------------------|-----|
| 1.5 | 1.5.1 | (a) | A ✓ – Dendrite ✓                     | (2) |
|     |       | (b) | D ✓ – Synapse ✓                      | (2) |
|     |       | (c) | E ✓ – Interneuron ✓/Connector neuron | (2) |
|     | 1.5.2 | (a) | B ✓                                  | (1) |
|     |       | (b) | C ✓                                  | (1) |
| 1.6 | 1.6.1 | (a) | Prostate gland ✓                     | (1) |
|     |       | (b) | Epididymis ✓                         | (1) |
|     | 1.6.2 | (a) | G ✓ – urethra ✓                      | (2) |
|     |       | (b) | E ✓ – testis ✓                       | (2) |

**TOTAL SECTION A: 50**

## SECTION B

## QUESTION 2

- 2.1 2.1.1 (a) Nuclear membrane ✓/(nucleus) (1)
- (b) DNA ✓ (1)
- 2.1.2 – Carries the coded message from DNA ✓ in the nucleus to the ribosomes for protein synthesis (1)
- 2.1.3 **Translation** ✓\*
- The anticodon on the tRNA/molecule **Z** matches the codon on the mRNA ✓
  - tRNA brings the required amino acid ✓
  - to the ribosome ✓/structure **F**
  - Amino acids are joined by peptide bonds ✓
  - to form the required protein ✓ (\*1 compulsory + 5) (6)
- 2.1.4 (a) Adenine ✓ (1)
- (b) UUU-CAU-GAC-GCG ✓✓ (correct sequence) (2)
- (c) GUA ✓✓ (2)
- 2.2.1 Prophase I ✓ (1)
- 2.2.2 – **Crossing over** ✓\*
- Chromosomes pair up ✓/ homologous chromosomes / bivalents form
  - Chromosomes overlap ✓/cross over
  - at points called chiasmata ✓
  - Exchange of genetic material occurs between chromatids ✓ /adjacent chromosome pairs
- (\*1 compulsory + 4) (5)
- 2.2.3 – Brings about variation ✓ in the gametes
- by ensuring that no two gametes are the same ✓ (2)
- 2.3 2.3.1 Pedigree diagram ✓/ Genetic lineage (1)
- 2.3.2 (a) 1 ✓ (1)
- (b) 2 ✓ (1)
- 2.3.3 (a)  $X^H X^h$  ✓ (1)
- (b)  $X^h Y$  ✓ (1)

2.3.4	<b>P<sub>1</sub></b>	Phenotype	Unaffected female	x	Unaffected male ✓
		Genotype	$X^H X^h$	x	$X^H Y$ ✓
	<i>Meiosis</i>	<b>G/gametes</b>	$X^H$ , $X^h$	x	$X^H$ , Y ✓
	<i>Fertilisation</i>				
	<b>F<sub>1</sub></b>	Genotype	$X^H X^H$	$X^H Y$ ;	$X^H X^h$ $X^h Y$
		Phenotype	unaffected, unaffected, unaffected, affected female male ✓ female male ✓ 25% chance of haemophiliac son ✓*		
	P <sub>1</sub> and F <sub>1</sub> ✓ Meiosis and fertilisation ✓				

(Any 5 + 1\* compulsory) (6)

OR

<b>P<sub>1</sub></b>	Phenotype	Unaffected female	x	Unaffected Male ✓									
	Genotype	$X^H X^h$	x	$X^H Y$ ✓									
<i>Meiosis</i>													
<i>Fertilisation</i>	<table border="1"> <tr> <td>Gametes</td> <td><math>X^H</math></td> <td><math>X^h</math></td> </tr> <tr> <td><math>X^H</math></td> <td><math>X^H X^H</math></td> <td><math>X^H X^h</math></td> </tr> <tr> <td>Y</td> <td><math>X^H Y</math></td> <td><math>X^h Y</math></td> </tr> </table>				Gametes	$X^H$	$X^h$	$X^H$	$X^H X^H$	$X^H X^h$	Y	$X^H Y$	$X^h Y$
Gametes	$X^H$	$X^h$											
$X^H$	$X^H X^H$	$X^H X^h$											
Y	$X^H Y$	$X^h Y$											
	1 mark for correct gametes ✓ 1 mark for correct genotypes ✓												
<b>F<sub>1</sub></b>	Phenotype ✓	<b>25% chance of haemophiliac son ✓*</b>											
P <sub>1</sub> and F <sub>1</sub> ✓ Meiosis and fertilisation ✓													

(Any 5 + 1\* compulsory) (6)

- 2.4.1 Accommodation ✓ (1)
- 2.4.2 (a) B ✓ / D (1)
- (b) E ✓ (1)
- 2.4.3
- The ciliary muscles relax ✓
  - Suspensory ligaments become taut ✓ / stretched
  - and the lens becomes less convex ✓ / flatter
  - decreasing the refractive power of the lens ✓
  - maintaining a clear image (4)

- 2.5 2.5.1 (a) Corpus luteum ✓ (1)  
 (b) Ovulation ✓ (1)
- 2.5.2 Oestrogen ✓ (1)
- 2.5.3 – FSH will not be released ✓ therefore  
 – no follicles will develop ✓ in the ovaries  
 – LH will not be released ✓ therefore  
 – no ovulation ✓ will occur  
 – The female will be infertile ✓ / cannot have babies (Any 4) (4)
- 2.5.4 – It continues secreting progesterone ✓  
 – To further increase the thickness of the endometrium ✓  
 – For possible implantation ✓ (3)  
**[50]**

### QUESTION 3

- 3.1 3.1.1 2 – Semi-circular canals ✓  
 3 – Auditory nerve ✓ (2)
- 3.1.2 5 – Equalises pressure on either side of the tympanic membrane ✓  
 6 – Transmits vibrations (sound waves) to the ossicles (middle ear) ✓ (2)
- 3.1.3 – A change in the position of the head  
 – stimulates the maculae ✓  
 – in the utricle and saccule ✓  
 – to convert the stimulus into an impulse ✓  
 – The impulse is sent to the cerebellum ✓  
 – through the auditory nerve ✓  
 – The cerebellum sends impulses to the skeletal muscles ✓  
 – to restore balance ✓ (Any 5) (5)
- 3.1.4 – Vibrations are not transmitted to the inner ear ✓  
 – Pressure waves not generated in cochlea ✓  
 – Organ of Corti is not stimulated ✓  
 – No impulse is transmitted to cerebrum ✓  
 – resulting in impaired hearing ✓ (Any 3) (3)
- 3.2 3.2.1 – Its larvae eat the contents of maize stems ✓  
 – this weakens the stems causing the plants to collapse ✓ (2)
- 3.2.2 – The spray may not reach all the larvae ✓ as  
 – they develop inside the stem ✓ and therefore  
 – are shielded from the spray ✓ (3)



- 3.2.3 (a) Type of treatment ✓/ protection (1)
- (b) Number of maize plants collapsed ✓ (1)
- 3.2.4 – As a control ✓  
– for comparison of results ✓ with and without treatment (2)
- 3.2.5 Average number of plants collapsed
- Plot B =  $\frac{0+0+22+0+1+11+2+0+1+6+13+17}{12}$  ✓  
= 6,08 ✓/ 6,1/ 6
- Plot C =  $\frac{1+0+21+0+0+12+1+1+0+0+1+0}{12}$  ✓  
= 3,08 ✓/3,1/3 (4)
- 3.2.6 – Using genetically modified Bt corn is more effective ✓ in protecting the maize against the corn borer moth than spraying the corn with Bt toxin ✓ (2)
- 3.2.7 – Long period of investigation ✓/ 12 weeks  
– Large sample used ✓/ Several hundreds of seedlings used (2)
- 3.2.8 Different scientists used for counting ✓/ each scientist may have counted differently from the other (1)
- 3.3 3.3.1 – For the body to be able to react to stimuli ✓  
– To co-ordinate the various activities of the body ✓ (2)
- 3.3.2 (a) E ✓ – corpus callosum ✓ (2)
- (b) C ✓ – spinal cord ✓ (2)
- 3.3.3 (a) – The medulla oblongata regulates vital life processes ✓  
– like breathing rate ✓/heart rate (2)
- (b) – The right cerebral cortex controls the left-hand side of the body ✓  
– A blood clot in the right cerebral cortex will inhibit voluntary action on the left-hand side of the body ✓ (2)

- 3.4 3.4.1 (a) Placenta ✓ (1)
- (b) Umbilical cord ✓ (1)
- 3.4.2 It provides the fluid medium for free movement of fetus ✓  
 It acts as a shock absorber  
 It protects the fetus against dehydration ✓  
 It protects the fetus against temperature changes ✓  
 Promotes lung development ✓  
 Holds waste ✓  
**(Mark first ONE only)** (Any 1) (1)
- 3.4.3 Respiratory ✓/Gaseous exchange system  
 Digestive ✓ system  
 Excretory ✓ system  
**(Mark first TWO only)** (Any 2) (2)
- 3.4.4
- | Vein                            | Artery                           |
|---------------------------------|----------------------------------|
| Oxygen content – High ✓         | Oxygen content – Low ✓           |
| Nutrient content – High ✓       | Nutrient content – Low ✓         |
| CO <sub>2</sub> content – Low ✓ | CO <sub>2</sub> content – High ✓ |
| Nitrogenous waste – Low ✓       | Nitrogenous waste – High ✓       |
- (Mark first ONE only)** 1 for table + Any (1 x 2 ) (3)
- 3.4.5 - High levels of progesterone ✓  
 - inhibit the secretion of FSH ✓ (2)

**[50]**

**TOTAL SECTION B: 100**  
**GRAND TOTAL: 150**