**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

JUNE 2025

**LIFE SCIENCES
MARKING GUIDELINE**

MARKS: 150

This marking guideline consists of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks 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 but 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 standardisation 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   D ✓✓
       1.1.2   B ✓✓
       1.1.3   B ✓✓
       1.1.4   A ✓✓
       1.1.5   B ✓✓
       1.1.6   D ✓✓
       1.1.7   D ✓✓
       1.1.8   B ✓✓
       1.1.9   C ✓✓   (9 x 2)   (18)

1.2   1.2.1   Peripheral ✓nervous system
       1.2.2   Multiple sclerosis ✓
       1.2.3   Interphase ✓
       1.2.4   Precocial ✓ development
       1.2.5   Convex ✓lenses
       1.2.6   Centriole ✓/centrosome
       1.2.7   Retina ✓
       1.2.8   Synapse ✓   (8 x 1)   (8)

1.3   1.3.1   Both A and B ✓✓
       1.3.2   A only ✓✓
       1.3.3   B only ✓✓   (3 x 2)   (6)

       1.4.1   (a)   Menstruation ✓   (1)
                (b)   Ovulation ✓   (1)

       1.4.2   (a)   LH ✓/Luteinising hormone   (1)
                (b)   Progesterone ✓   (1)

       1.4.3   (a)   Ovarian ✓ cycle   (1)
                (b)   Uterine ✓cycle   (1)

       1.4.4   Ovary ✓   (1)

       1.4.5   (a)   Ovum ✓   (1)
                (b)   Endometrium ✓   (1)

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Please turn over

1.5   1.5.1   Cytoplasm ✓   (1)

      1.5.2   (a)   Peptide ✓   (1)
            (b)   mRNA ✓/ messenger RNA/ messenger Ribonucleic acid   (1)

      1.5.3   (a)   Anticodon ✓   (1)
            (b)   tRNA ✓/ transfer Ribonucleic acid   (1)
            (c)   Ribosome ✓   (1)

      1.5.4   ACC ✓   (1)

      1.5.5   2 ✓ Amino acid ✓   (2)

TOTAL SECTION A: 50

QUESTION 2

2.1   2.1.1   -   An arrangement of black bars/lines/stripes representing DNA fragments of a person ✓✓

<div align="center">

OR

</div>

                 -   The pattern of the bars that indicate the sequence of bases on a DNA strand. ✓✓

<div align="center">

OR

</div>

                 -   A set of genetic characteristics that results from forensic DNA analysis of several DNA markers. ✓✓   (2)

      2.1.2   B ✓   (1)

      2.1.3   -   A child received DNA from both parents ✓
                 -   The DNA profiles of the mother, child and the possible father are determined ✓
                 -   A comparison of the DNA bands of the mother and the child is made ✓
                 -   The remaining DNA bands are compared to the possible father's DNA bands ✓
                 -   If all the remaining DNA bands in the child's profile match the possible father's DNA bands then the possible father is the biological father ✓
                 -   If all the remaining DNA bands in the child's profile does not match the possible father's DNA bands then the possible father is not the biological father ✓   (6)

      2.1.4   -   To identify individuals from their remains
                 -   To identify family relationships other than paternity, e.g. siblings or cousins
                 -   To test for the presence of specific alleles/ genes that cause a genetic disorder
                 -   To establish matching tissues for organ transplants   (Any 2 x 1)   (2)

2.2   2.2.1   45 ✓   (1)

      2.2.2   Gonosomes ✓/sex chromosomes   (1)

      2.2.3   -   Edwards syndrome have three copies of chromosome 18 ✓ instead of the usual two
                 -   Down syndrome have three copies of chromosome 21 ✓ instead of the usual two   (2)

2.2.4   -   During Anaphase I / II ✓
        -   Non-disjunction ✓ occurs
        -   in chromosome pair 18 ✓/chromatids of chromosome 18 which
        -   will lead to the formation of a gamete with an extra chromosome
            number 18 ✓/2 chromosomes number 18
        -   If this gamete fuses with a normal gamete ✓
        -   a zygote with 3 chromosomes number 18 will form ✓
        -   The fusion between an abnormal gamete (24 chromosomes) and a
            normal gamete (23 chromosomes) may lead to Edwards syndrome ✓

(Any 6 x 1)   (6)

2.3 2.3.1   Co-dominance ✓   (1)

    2.3.2   -   The alleles are equally dominant ✓
           -   both are expressed in the phenotype ✓   (2)

    2.3.3 P_1 Phenotype   Speckled feathers x   Speckled feathers
                      Genotype   BW ✓   x   BW ✓
             Meiosis

                    G/gametes B   W   x   B   W ✓

             Fertilisation

             F_1 Genotype: BB ;   BW ;   BW;   WW ✓*

                     Phenotype: 1 black : 2 speckled : 1 white ✓*

           P_1 and F_1 ✓
           Meiosis and fertilisation ✓ **two compulsory marks and Any 4**

OR

        P_1 Phenotype Speckled feathers x Speckled feathers
                   Genotype   BW ✓   x   BW ✓
        Meiosis

                 G/gametes B ,   W   x   B ,   W ✓

        Fertilisation
        F_1

Gametes	B	W
B	BB	BW
W	BW	WW
Correct gametes ✓		
Correct genotypes ✓*		

                 Phenotype   1 black : 2 speckled : 1 white ✓*

        P_1 and F_1 ✓
        Meiosis and fertilisation ✓ **two compulsory marks and Any 4**   (6)

2.4   2.4.1   (a)   Medulla oblongata ✓ (1)
              (b)   Corpus callosum ✓ (1)

      2.4.2   A ✓ (1)

      2.4.3   Behind and below the cerebrum ✓✓ (2)

      2.4.4   (a)   - Part **A**/ cerebrum which receives and interprets sensations from sense organs ✓
                   - Part **A**/ cerebrum was not injured ✓ (2)

              (b)   - The learner (occasionally) experience difficulty balancing when kicking ✓
                   - due to no coordination of voluntary movements by cerebellum ✓ / decreased muscle tone (2)

      2.5.1   (a)   Semi-circular canals ✓ (1)
              (b)   Tympanic membrane ✓/ eardrum (1)

      2.5.2   (a)   F ✓ (1)
              (b)   B ✓ (1)

      2.5.3   Part C/ Oval window transfers pressure wave **to** the inner ear. ✓ /
Receives vibrations **from** the ossicle/ middle ear
Part E/ Round window receives pressure waves **from** the inner ear ✓ /
transfers pressure waves **to** the middle ear / eustachian tube (2)

      2.5.4   Organ of Corti ✓/hair cells (1)

      2.5.5   - Air will not be move in ✓/out of middle ear
              - to equalise pressure on both sides of the tympanic membrane ✓
              - Tympanic membrane/ossicles may not vibrate freely ✓
              - This may lead to the tympanic membrane bursting ✓
              - and therefore, could lead to hearing loss ✓/deafness   (Any 4 x 1)   (4)

[50]

QUESTION 3

3.1   3.1.1   -   Amniotic ✓ fluid   (1)

        3.1.2   -   Shock absorber, ✓ protects the foetus from mechanical damage ✓
                  -    Thermoregulation ✓ prevents extreme temperature changes ✓
                  -    Moist environment ✓ to prevent desiccation ✓
                  -    Free movement ✓ within the womb, promoting muscular and skeletal
                       development ✓
                  -    Environment ✓ provides the medium in which the foetus moves
                       /breathes / swallows ✓   (Any 1 x 2)   (2)
                  (Mark first ONE only)

        3.1.3   -   After implantation the chorion develops many finger-like outgrowths ✓
                  -    called chorionic villi ✓
                  -    The endometrium ✓
                  -    together with the chorionic villi ✓ forms the placenta
                  -    The umbilical artery ✓
                       and the umbilical vein ✓ develops
                       inside a hollow tube ✓
                       to form the umbilical cord between the foetus and the placenta ✓
                                                                                            (Any 6 x 1)   (6)

        3.1.4   Increased progesterone and oestrogen concentrations:
                  -    inhibits the pituitary gland ✓ from
                  -    secreting FSH ✓and
                  -    secreting LH ✓
                  -    therefore, no Graafian follicle will develop ✓
                  -    No ovulation will take place ✓/ No ovum will be present for
                       fertilisation   (Any 4 x 1)   (4)

        3.1.5   -   The Fallopian tube is unable to provide the space ✓
                  -    and there is no endometrium ✓/blood supply
                  -    to provide nutrients ✓/oxygen **OR** remove waste products
                  -    in order for the embryo to develop ✓   (4)

3.2   3.2.1   -   Breast development ✓
                  -    Start of menstruation ✓
                  -    Widening of the hips ✓
                  -    Growth of pubic hair ✓
                  -    Growth of underarm hair ✓   (Any 2 x 1)   (2)
                  (Mark first TWO only)

        3.2.2   -   Under the influence of testosterone ✓
                  -    diploid cells in the seminiferous tubules of the testes ✓
                  -    undergo meiosis ✓
                  -    to form haploid sperm cells ✓   (4)

3.3 3.3.1 - sperm and ova are in close contact ✓ to increase the chance of fertilisation taking place ✓
- gametes not exposed to predators ✓ / water currents / desiccation to increase chance of fertilisation ✓
- does not rely on water for gamete transport ✓ increase possibility of fertilisation taking place ✓
- reduces the risk of gametes being lost or wasted, ✓ increasing chance of fertilisation ✓ (Any 2 x 2) (4)

3.3.2 parental care increases ✓ the chances of offspring survival (1)

3.4 - Less light would enter the eye ✓ / pupil
- Less light would fall on the retina ✓ / receptors would be stimulated less
- The image would not be clear ✓ (3)

3.5 3.5.1 Wheat without insect poison gene that was grown in the field ✓ (1)

3.5.2 Ensuring that any differences in yield are due to genetic modification ONLY ✓✓ /and not external factors (1)

3.5.3 (70 – 50) ✓ = 20 ✓(arbitrary units) (2)

3.5.4 - Non-GM plants may be better suited ✓ to the local environment (specific climates, soil, or farming practices), while GM plants may not ✓ always be as well-suited to local conditions.
- Non-GM plants may be better equipped to handle stresses (like drought, competition with weeds, nutrient limitations) ✓ while GM plants may not ✓ always be as well-suited to local conditions.
- Non-GM plants may maintain more natural or symbiotic relationships with beneficial soil organisms, ✓ giving them an advantage in nutrient uptake and overall health. ✓
- Non-GM plants contributes to biodiversity and help maintain a balanced ecosystem ✓
- GM plants, especially, can disrupt local ecosystems by affecting non-target insects and other organisms ✓
- GM crops can lead to the rise of weeds ✓ that are resistant to pesticides (insect poison)
- decreasing their effectiveness. ✓ (Any 1 x 2) (2)

3.5.5 Insect poison reduces ✓ insect populations numbers and biodiversity. (1)

3.6 3.6.1 To determine the relationship between different blood groups and risk to specific diseases. ✓✓ (2)

3.6.2 - Determine the sample size
- Decide on the age-group of the participants
- Decide on diseases to be tested for (Any 2 x 1) (2)
(Mark first TWO only)

3.6.3 500 individuals ✓participated (1)

3.6.4
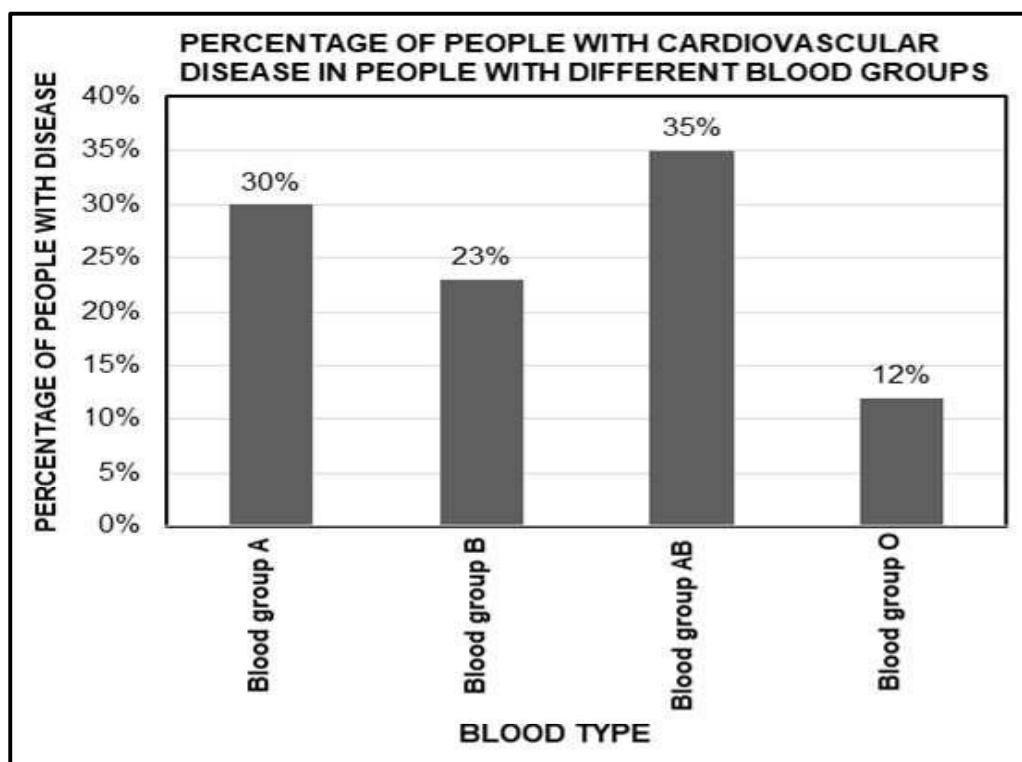
Guideline for assessing graph:

CRITERIA	MARK
Bar graph is drawn **(T)**	1
Caption of the graph includes both variables **(C)**	1
Correct labels on the X-axis and Y-axis with correct unit on the Y-axis **(L)**	1
Correct scale for Y-axis and bars of equal width and spaces for X-axis **(S)**	1
Plotting **(P)** correctly done for: 1–3 blood types All 4 required blood types	 1 1

(6)

- Bar graph or line graph drawn – Lose marks for type of graph and scale
- Transposed axes: Can get full credit, if axes labels are also swapped and bars are horizontal. If labels are not corresponding, then lose marks for labels and scale
- Check that the plotting is correct for the given labels   **[50]**

TOTAL SECTION B: 100
GRAND TOTAL: 150