These marking guidelines consist of 9 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 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. Memorandum 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.

19. **Changes to the memorandum**
No changes must be made to the memoranda without consulting the provincial internal moderator who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. **Official memoranda**
Only memoranda bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.
SECTION A

QUESTION 1

1.1 1.1.1 D✓✓
     1.1.2 B✓✓
     1.1.3 C✓✓
     1.1.4 C✓✓
     1.1.5 B✓✓
     1.1.6 B✓✓
     1.1.7 D✓✓
     1.1.8 B✓✓
     1.1.9 C✓✓
     1.1.10 A✓✓ (10 x 2) (20)

1.2 1.2.1 Monoculture✓
     1.2.2 Deforestation✓
     1.2.3 Penis✓
     1.2.4 Peripheral✓
     1.2.5 Binocular✓/stereoscopic vision
     1.2.6 Corpus luteum✓
     1.2.7 Synapse✓
     1.2.8 Aquifer✓
     1.2.9 Oestrogen✓ (9 x 1) (9)

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

1.4 1.4.1 (a) Semi-circular canals✓
      (b) Auditory nerve✓ (1)
     1.4.2 (a) E✓ Oval window✓ (2)
      (b) D✓ Round window✓ (2)
     1.4.3 (a) Cerebellum✓ (1)
      (b) Hair cells✓/Organ of Corti (1) (8)

1.5 1.5.1 Reflex arc✓ (1)
     1.5.2 To minimise injury✓ (1)
     1.5.3 (a) Interneuron✓/connector (1)
      (b) Ventral root✓ (1)
      (c) Effector✓/muscle (1)
     1.5.4 A✓ Sensory✓/neuron (2) (7)

TOTAL SECTION A: 50
## SECTION B

### QUESTION 2

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Marking</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1</td>
<td>Centromere ✓</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>2.1.2</td>
<td>Metaphase I ✓</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>2.1.3</td>
<td>A pair of chromosomes with the same structure ✓/ location of centromere/ length and - the same sequence of genes ✓ - One is of maternal origin and the other of paternal origin ✓ Any (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.4</td>
<td>Some chromatids have a mixture of genetic material ✓ from its homologue - as crossing over ✓ took place - during prophase I ✓ (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.5</td>
<td>(Contracts) to pull the chromosome to the pole ✓ (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.6</td>
<td>48 ✓ arbitrary units (2) (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>2.2.1 Sweat gland ✓ (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Structure A will constrict ✓/ vasoconstriction occurs - Less blood flows towards the surface ✓ of the skin - Less heat is lost ✓ through the surface of the skin - Temperature increases ✓/ returns to normal Any (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.3</td>
<td>Enzymes function optimally ✓ at normal body temperature ✓/ 37° C - Enzymes/proteins will denature ✓ at high temperatures ✓ - Enzymes will become inactive ✓ at low temperatures ✓ Any (1 x 2) (2) (Mark first ONE only) (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>2.3.1 Pituitary gland ✓/ Hypophysis/ Hypothalamus (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water levels are higher than normal in blood ✓ - since less water is lost through sweating ✓ - therefore less/no ADH will be secreted ✓ - renal tubules become less permeable to water ✓ - Therefore, less water is reabsorbed ✓/ more urine is produced Any (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water cannot be reabsorbed ✓/ the water is in the urine since renal tubules are resistant to the effects of ADH - Water levels are lower than normal in blood ✓ - therefore, more ADH is secreted ✓ (3) (7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4 2.4.1 Internal ✓ fertilisation

2.4.2 - Sperm are deposited inside the female body ✓ thereby increasing the chances of fertilisation ✓
- Gametes/zygotes are inside the body ✓ therefore protected from the predators ✓/ environmental dangers (2 x 2)  
(Mark first TWO only)

2.4.3 - The eggs hatch inside the female’s body ✓
- and the young are born live ✓

2.5 2.5.1 - Progesterone maintains/thickens the endometrium ✓
- and therefore, maintains the pregnancy ✓

2.5.2 (a) Progesterone treatment ✓
(b) Development of gestational diabetes ✓

2.5.3 - Glucose levels were taken ✓ daily
- When the glucose level of a pregnant woman remains high continuously ✓ it indicates the development of gestational diabetes

2.5.4 - (Same) dosage ✓/250 mg of progesterone
- (Same) period of time for injection ✓/injections given between weeks 16 and 20
- (Same) frequency of injections ✓/ weekly injections Any  
(Mark first TWO only)

2.5.5 - Group B did not receive progesterone ✓
- If gestational diabetes develops in group A it would be due to the progesterone treatment ✓

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QUESTION 3

3.1  3.1.1  Sclera √

3.1.2  - Absorbs light rays √/prevents internal reflection of light in the eye
- Blood vessels in part B supply the cells of the eye with oxygen √/nutrients Any (1)

(Mark first ONE only)

3.1.3  - Part D contains photoreceptors √/cones
- therefore the (clearest) image forms √ if light falls on this part
- Part E has no photoreceptors √/rods and cones
- therefore, no image √ will form if light falls on this part (4)

3.1.4  (Bi)concave √ lenses (1)

3.1.5  - Biconcave lenses will help to diverge the light √ before they enter the eye
- to focus on the retina (2)

3.1.6  - It is elastic √
and can change its shape √ to focus light rays on the retina

(Mark first ONE only) (1 x 2) (2)

3.1.7  - Radial √/dilator muscles
- Circular √/sphincter muscles (2)

(Mark first TWO only)

3.1.8  - Astigmatism √
- Light is refracted unevenly √/distorted
- forming a blurred image √ (3) (16)

3.2  3.2.1  They stimulate cell elongation √/cell division (1)

(Mark first ONE only)

3.2.2  - To prevent weeds from competing with crops √
- for water √/nutrients/space/sunlight (2)

3.2.3  - They may kill other organisms √
- They may accumulate in ecosystems √
- They may disrupt ecosystems √ Any (1)

(Mark first ONE only)

3.2.4  - The application of auxin-based herbicides is less labour intensive √/less time-consuming/less expensive than mechanical removal
- Auxin-based herbicides will kill the whole plant but with physical removal only part of the plant may be removed √ Any (1 x 2) (2)

(Mark first ONE only)

3.2.5  - Auxin-based herbicides selectively kill broad leaved plants √
- and the farmer will lose money √/the bean crop will fail (2) (8)
3.3.1 Sheep and goats✓

3.3.2 To trap heat energy/ keep Earth warm enough to sustain life✓

(Mark first ONE only)

3.3.3 $4\,623 - 1\,826 = 2\,797$ million tonnes

= $2\,797\,000\,000$ (tonnes)

(2)

3.3.4 - Landfills✓
- Rice paddies✓
- Waterlogged soil✓/wetlands
- Mining of coal✓
- Fossil fuels✓
- Biofuels✓
- Fracking✓
- Sewage✓
- Decomposition✓
- Melting of ice in glaciers✓

(Mark first ONE only)

Any (1)

3.3.5 - More greenhouse gases✓/ carbon dioxide/ methane is released into the atmosphere
- Therefore, more heat is trapped✓/causing an enhanced greenhouse effect
- leading to an increase in (global) temperatures✓
- hence global warming increases

Any (3)

(8)

3.4 3.4.1 Thermal pollution refers to the change from the normal temperature of an aquatic ecosystem✓

(1)

3.4.2 - Thermal pollution lowers the oxygen content✓/causes algal bloom/increased number of bacteria in the water
- which reduces✓ the quality of the water

(2)

3.4.3 - The hot water can be stored until it is cooled down✓ before it is released into the river
- After cooling down the hot water, it can be re-used to cool down the plant again✓
- Use fans/other technology for cooling down of machinery✓

(Mark first ONE only)

Any (1)

3.4.4 - The warm water may cause fish to die✓/move away
- which will cause a loss of income✓ to the fishermen

(2)

3.4.5 - The biodiversity increased✓
- since no thermal pollution occurred✓

(2)

(8)

[40]

TOTAL SECTION B: 80
SECTION C

QUESTION 4

Development of zygote and the formation of placenta and umbilical cord

- The zygote divides by mitosis ✓
- to form a (solid) ball of cells ✓
- called the morula ✓
- which further divides to form a hollow ball of cells ✓
- called the blastocyst/blastula ✓
- The blastocyst/blastula enters the uterus ✓
- It implants in the endometrium ✓
- This is called implantation ✓

- The outer layer of the embryo becomes a chorion ✓ and
- inner layer becomes an amnion ✓
- with the amniotic fluid inside ✓

- After implantation the chorion develops many finger-like outgrowths ✓
- called chorionic villi ✓
- The endometrium together with the chorionic villi forms the placenta ✓
- The placenta consists of blood rich embryonic and maternal tissues ✓

- The umbilical cord develops between the foetus and the placenta ✓
- It consists of a hollow tube ✓
- that contains the umbilical artery ✓
- and the umbilical vein ✓

- Up to 8 -12 weeks of development it is called the embryo ✓
- When differentiation of tissues into organs occurs ✓
- and now is called a foetus ✓

ASSESSING THE PRESENTATION OF THE ESSAY

<table>
<thead>
<tr>
<th>Relevance</th>
<th>Logical sequence</th>
<th>Comprehensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>All information provided is relevant to the question</td>
<td>Ideas arranged in a logical/cause-effect sequence</td>
<td>Answered all aspects required by the essay in sufficient detail</td>
</tr>
<tr>
<td>All the information is relevant to:</td>
<td>The sequence of the events in the:</td>
<td>The following must be included:</td>
</tr>
<tr>
<td>- Development from the zygote to the formation of the placenta and umbilical cord</td>
<td>- Development from the zygote to the formation of the placenta and umbilical cord</td>
<td>- Development from the zygote to the formation of the placenta and umbilical cord (11/17)</td>
</tr>
<tr>
<td>No irrelevant information</td>
<td>are in a logical sequence</td>
<td></td>
</tr>
</tbody>
</table>

1 mark | 1 mark | 1 mark |

1 mark | 1 mark | 1 mark |

1 mark | 1 mark | 1 mark |

TOTAL SECTION C: 20
GRAND TOTAL: 150