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**GRADE 12**

**SEPTEMBER 2020**

**LIFE SCIENCES P1  
MARKING GUIDELINE**

**MARKS: 150**

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This marking guideline consists of 12 pages.

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**PRINCIPLES RELATED TO MARKING LIFE SCIENCES**

1. **If more information than marks allocated is given**  
Stop marking when maximum marks are 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. Marking guidelines 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 learner's 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 C ✓✓  
1.1.2 B ✓✓  
1.1.3 B ✓✓  
1.1.4 D ✓✓  
1.1.5 B ✓✓  
1.1.6 C ✓✓  
1.1.7 B ✓✓  
1.1.8 D ✓✓ (8 x 2) (16)
- 1.2 1.2.1 Vasodilation ✓  
1.2.2 Hypothalamus ✓  
1.2.3 Negative feedback ✓  
1.2.4 Parasympathetic system ✓  
1.2.5 Aldosterone ✓  
1.2.6 Synapse ✓  
1.2.7 Placenta ✓ (7 x 1) (7)
- 1.3 1.3.1 None ✓✓  
1.3.2 A only ✓✓  
1.3.3 A only ✓✓ (3 x 2) (6)
- 1.4 1.4.1 (a) A ✓ (1)  
(b) E ✓ (1)  
(c) B ✓ (1)  
(d) F ✓ (1)
- 1.4.2 Spinal cord ✓ (1)
- 1.4.3 Reflex action ✓ (1)
- 1.4.4 Brain ✓ and the spinal cord ✓ (2)
- 1.4.5 (a) C ✓ (1)  
(b) D ✓ (1)

- |     |       |     |  |     |
|-----|-------|-----|--|-----|
| 1.5 | 1.5.1 | (a) | A – Vagina ✓   | (1) |
|     |       | (b) | B – Cervix ✓   | (1) |
|     |       | (c) | F – Uterus ✓   | (1) |
|     | 1.5.2 | (a) | C ✓ endometrium ✓  | (2) |
|     |       | (b) | D ✓ Ovary ✓  | (2) |
|     |       | (c) | E ✓ Fallopian tube ✓   | (2) |
|     | 1.5.3 |     | Sperm will not be able to fertilise the ovum ✓/ sperm will not be able to reach ovum and cause fertilisation | (1) |
|     | 1.5.4 |     | Both ovaries release ova ✓ alternately   | (1) |

**TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

- 2.1 2.1.1 (a) Prophase I ✓ (1)
- (b) Metaphase I ✓ (1)
- 2.1.2 (a) A – Centromere ✓ (1)
- (b) B – Homologous chromosomes ✓ / Chromosomes (1)
- (c) D – Centriole ✓ (1)
- 2.1.3 - Homologous chromosomes lie side by side ✓  
 - Chromatids from the paternal and maternal chromosomes ✓  
 - Establish contact points called chiasmata ✓ and  
 - Exchange genetic material between chromatids ✓ and  
 - This is known as crossing over ✓ (Any 4) (4)
- 2.1.4 - Homologous chromosomes randomly arrange themselves ✓  
 - on either side of the equator ✓ and this  
 - leads to the formation of new combinations of genetically  
 - different ✓ chromosomes  
 - in the daughter cells (gametes) causing variation\* ✓ in the next  
 generation (1\* compulsory point + any 2) (3)
- 2.2 2.2.1 Altricial ✓ development (1)
- 2.2.2 - Eyes closed ✓  
 - no down feathers covering the body ✓ / bodies naked  
 - unable to feed themselves ✓  
**(Mark first THREE only)** (3)
- 2.2.3 - Complete dependence on parents ✓ until fully developed  
**OR**  
 - unable to defend/move ✓  
 - therefore, they are an easy target for predation ✓ (Any  
 1) (1)
- 2.2.4 - The egg yolk that supplies nutrients to the developing embryo is  
 small ✓ therefore,  
 - the hatchlings are unable to develop fully ✓ before hatching (2)

- 2.3 2.3.1 Long/far-sightedness ✓ (Hypermetropia) (1)
- 2.3.2 - Eye ball is too rounded ✓  
- due to the inability of the lens of the eye to become more convex ✓  
- therefore, the image of the near object that falls on the retina is blurred ✓ while  
- the most clearly focussed image falls behind the retina ✓ (4)
- 2.3.3 It can be corrected with a convex lens ✓  
**(Mark first ONE only)** (1)
- 2.3.4 - The radial muscles of the iris contract ✓  
- the circular muscles relax ✓  
- the pupil dilates ✓  
- the amount of light entering the eye is increased ✓ (4)
- 2.4 2.4.1 Luteinizing hormone ✓ (LH) (1)
- 2.4.2 The highest level of LH causes ovulation ✓ (1)
- 2.4.3 13<sup>th</sup> ✓ day of the cycle (1)
- 2.4.4 - High level of oestrogen ✓ / an increase in level of oestrogen causes the endometrium to become more  
- vascular and spongy/thicker ✓ (2)
- 2.4.5 Progesterone ✓ (1)
- 2.4.6 - The maintenance of high levels of progesterone / hormone **B** after 28 days indicates pregnancy ✓  
- hormone B / progesterone is required to maintain pregnancy ✓ / maintain the endometrium (2)
- 2.4.7 - High levels of progesterone inhibit the secretion of FSH in order to stop the development of new follicles ✓ and  
- cause ovulation ✓ / no new ova produced  
- during pregnancy ✓ / disrupts pregnancy (3)

**[40]**

**QUESTION 3**

- 3.1 3.1.1 Thyroid gland ✓ (1)
- 3.1.2 Treatment of thyroxin ✓ / substance tadpoles were treated with (1)
- 3.1.3 - Quantity of NaOH and thyroxin treatment ✓  
- Time of treatment/ feeding ✓  
- Time of collecting data ✓  
- Size of tadpoles ✓  
- Type of nutrients ✓  
- Quantity of nutrients ✓  
- Level of activity / area of captivity ✓  
- Environmental conditions ✓  
- Method of determining the body mass ✓  
**(Mark first TWO only)** (Any 2) (2)
- 3.1.4 The initial body mass ✓ taken before the treatment (1)
- 3.1.5 - High levels of thyroxin ✓ in the body  
- increase the rate of metabolism ✓  
- More glucose will be oxidised ✓/ more of their fuel reserves are used up  
- to release more energy ✓/ allowing them to be more active  
- this leads to drop in the body mass (4)
- 3.1.6 - When the thyroxin level drops below normal limits  
- pituitary gland / hypophysis is stimulated ✓  
- Pituitary gland secretes more TSH ✓  
- High TSH level stimulates the thyroid gland ✓  
- The thyroid gland secretes more thyroxin ✓  
- The thyroxin level thus increases ✓  
- Thyroxin level returns to normal (5)

- 3.2 3.2.1 (a) B – Medulla oblongata ✓ (1)
- (b) C – Corpus callosum ✓ (1)
- (c) E – Cerebellum ✓ (1)
- 3.2.2 (a) - It conducts impulses between the brain and the receptors / effectors ✓  
- Serves as a reflex centre for actions ✓ such as blinking, sneezing, coughing etc. (Any 1) (1)  
**(Mark first ONE only)**
- (b) - Cerebro-spinal fluid in the central canal supplies nutrients and oxygen for nerve cells ✓/ removes CO<sub>2</sub> and waste products from the nerve cells / protects the brain and spinal cord against physical injury  
**(Mark first ONE only)** (1)
- 3.2.3 (a) - During a haemorrhage, the blood leaks out of the blood capillaries ✓  
- and this disrupts the supply of oxygen and nutrients to the nerve cells ✓/ removal of CO<sub>2</sub> and metabolic waste causing them to die ✓ / causes excessive pressure (3)
- (b) - Loss of sensation ✓ / consciousness / unable to process impulses from sense organs  
- loss of higher intellectual abilities ✓ such as memory, judgement, reasoning. etc.  
- unable to initiate voluntary muscular actions ✓ (3)
- 3.3 3.3.1 Auxin ✓ (1)
- 3.3.2 Auxin is present / produced at the growing tip ✓ of stem or root (1)
- 3.3.3 To cancel the effect of unilateral light on plumule growth ✓ / to show that the light has no effect on the upward bending of plumule / to exclude a phototropic response (1)

3.3.4 When a plumule is placed horizontally:

- Auxins are attracted by gravity ✓
- There is a high concentration of auxins on the lower side of the plumule ✓
- which stimulates growth / cell elongation / cell division on the lower side ✓
- There is a low concentration of auxins on the upper side of the plumule ✓
- which inhibits growth ✓/ cell elongation / cell division on the upper sides
- The lower side of the plumule grows faster ✓/ uneven growth occurs causing the plumule to grow/ bend upwards ✓
- The plumule grows away from gravity\* ✓/ the plumule is negatively geotropic

**1\* Compulsory mark + (Any 3) (4)**

3.3.5 The germinating seed is attached to the disc of rotating clinostat ✓ (1)

3.4 3.4.1 - Has a protective function ✓  
 - Acts as a climate control system for the testes ✓ / temperature control  
**(Mark first TWO only) (2)**

3.4.2 Epididymis ✓ (1)

3.4.3 - Fertility is reduced ✓  
 - because the temperature is always high ✓  
 - This will lead to production of abnormal sperms ✓/ fewer sperm are formed / proteins in the cells that form the sperm will denature

**OR**

- Fertility is reduced ✓
- because the pressure is increased ✓/ reducing circulation of the blood
- This will lead to the production of abnormal sperm ✓/ Fewer sperms are formed (3)

3.4.4 Take regular breaks ✓ while driving long distances (1)

**[40]**

**TOTAL SECTION B: 80**

**SECTION C****QUESTION 4**

**The process that led to an increased breathing rate:**

- The adrenal gland ✓
- secretes more adrenalin into the blood ✓
- An increased level of carbon dioxide ✓ in the surrounding area due to the heavy smoke
- causes carbon dioxide levels in the blood to increase above the normal levels ✓
- Receptor cells in the carotid artery in the neck are stimulated ✓
- to send impulses to the medulla oblongata in the brain ✓
- Medulla oblongata stimulates breathing muscles (intercostal muscles and diaphragm) ✓
- and heart ✓
- Breathing muscles contract more actively ✓
- Increases the rate and depth of breathing ✓
- The heart beats faster ✓
- More carbon dioxide is taken to and exhaled from the lungs ✓
- causing the breathing rate to increase

Max. 10 (10)

**Restoring balance**

Balance is achieved in the following way:

- The maculae ✓
- in the utricle and saccule ✓ and
- the cristae ✓
- in the semi-circular canals are stimulated ✓
- They generate impulses ✓
- which are transmitted through the auditory nerve ✓
- to the cerebellum ✓
- where they are interpreted ✓
- Impulses are transmitted via the motor neuron ✓
- to skeletal muscles ✓
- to restore balance

Max. 7 (7)

**Content (17)**

**Synthesis (3)**

**(20)**

**ASSESSING THE PRESENTATION OF THE ESSAY**

<b>Relevance</b>	<b>Logical sequence</b>	<b>Comprehension</b>
All information provided is relevant to the question	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay in sufficient detail
<p>All information is relevant to the:</p> <ul style="list-style-type: none"> <li>- Process that led to an increased breathing rate</li> <li>- Restoring balance</li> </ul> <p>There is no irrelevant information</p>	<p>The sequence of events and facts in the:</p> <ul style="list-style-type: none"> <li>- Process that led to an increased breathing rate</li> <li>- Restoring balance</li> </ul> <p>Are in a logical sequence</p>	<p>The following must be included:</p> <ul style="list-style-type: none"> <li>- Process that led to an increased breathing rate <b>(B)</b> – (7/10)</li> <li>- Restoring balance <b>(R)</b> – (4/7)</li> </ul>
<b>1 mark</b>	<b>1 mark</b>	<b>1 mark</b>

**TOTAL SECTION C: 20**  
**GRAND TOTAL: 150**