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# **Northern Cape Department of Education**

**GRADE 12**

**LIFE SCIENCES**

**MEMORANDUM**

**JUNE 2024**

**TIME: 2  $\frac{1}{2}$  HOURS**

**MARKS: 150**

**This question paper 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 part of it is required**  
Read all and credit relevant part.
4. **If comparisons are asked for and descriptions are given**  
Accept if 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.
9. **Non-recognised abbreviations**  
Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of 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 recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names given in terminology**  
Accept provided it was accepted at the National memo discussion meeting.
14. **If only letter is asked for and only name is given (and vice versa)**  
No 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 appears 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. No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator.

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

|                         |        |   |          |                          |
|-------------------------|--------|---|----------|--------------------------|
| 1.1                     | 1.1.1  | C✓✓   |          |                          |
|                         | 1.1.2  | B✓✓   |          |                          |
|                         | 1.1.3  | D✓✓   |          |                          |
|                         | 1.1.4  | A✓✓   |          |                          |
|                         | 1.1.5  | C✓✓   |          |                          |
|                         | 1.1.6  | B✓✓   |          |                          |
|                         | 1.1.7  | D✓✓   |          |                          |
|                         | 1.1.8  | A✓✓   |          |                          |
|                         | 1.1.9  | D✓✓   |          |                          |
|                         | 1.1.10 | B✓✓   | (10 x 2) | <b>(20)</b>              |
| 1.2                     | 1.2.1  | Mitochondria ✓  |          |                          |
|                         | 1.2.2  | Monohybrid cross✓   |          |                          |
|                         | 1.2.3  | <b>DO NOT MARK THIS QUESTION</b>                              |          |                          |
|                         | 1.2.4  | Blastocyst/blastula✓  |          |                          |
|                         | 1.2.5  | Acrosome✓   |          |                          |
|                         | 1.2.6  | <b>DO NOT MARK THIS QUESTION</b>                              |          |                          |
|                         | 1.2.7  | Precocial✓development   | (5 x 1)  | <b>(5)</b>               |
| 1.3                     | 1.3.1  | Both A and B✓✓  |          |                          |
|                         | 1.3.2  | B only✓✓  |          |                          |
|                         | 1.3.3  | A only✓✓  |          |                          |
|                         | 1.3.4  | A only✓✓  |          |                          |
|                         | 1.3.5  | B only ✓✓   | (5 x 2)  | <b>(10)</b>              |
| 1.4                     | 1.4.1  | DNA Replication ✓   |          | (1)                      |
|                         | 1.4.2  | Nucleotide ✓  |          | (1)                      |
|                         | 1.4.3  | Phosphate ✓<br>Deoxyribose sugar ✓<br>Nitrogen base/Thymine ✓ |          | (3)                      |
|                         | 1.4.4  | 1 – guanine ✓<br>2 – cytosine ✓                               |          | (2)<br><b>(7)</b>        |
|                         | 1.5.1  | (a) Tympanic membrane✓/Eardrum<br>(b) Cochlea ✓               |          | (1)<br>(1)               |
|                         | 1.5.2  | (a) A ✓<br>(b) B ✓  |          | (1)<br>(1)               |
|                         | 1.5.3  | (a) Organ of Corti ✓<br>(b) Auditory nerve ✓                  |          | (1)<br>(1)<br><b>(6)</b> |
| <b>TOTAL SECTION A:</b> |        |   |          | <b>48</b>                |



## SECTION B

## QUESTION 2

- 2.1 2.1.1 (a) mRNA ✓/ messenger RNA (1)  
 (b) Translation ✓ (1)  
 (c) Amino acid ✓ (1)
- 2.1.2 AGU ✓ (1)
- 2.1.3 **Transcription\*** ✓  
 • The double helix DNA unwinds ✓.  
 • The double-stranded DNA unzips ✓/weak hydrogen bonds break to form  
 • **two separate** strands. ✓  
 • One strand is used as a template ✓  
 • to form mRNA ✓  
 • using free RNA nucleotides ✓ from the nucleoplasm.  
 • The mRNA is complementary ✓ to the DNA.  
 • mRNA now has the coded message for protein synthesis. ✓  
**(1\* compulsory mark + Any 4)** (5)
- 2.1.4 Glycine ✓ - Methionine ✓ - Arginine ✓ **(In this order)** (3)  
**(12)**
- 2.2 2.2.1 (a) A – Nuclear membrane ✓ (1)  
 (b) C – Spindle fibers ✓ (1)
- 2.2.2 **DO NOT MARK THIS QUESTION**
- 2.2.3 Same size/length ✓  
 Same shape ✓  
 Same centromere position ✓  
**(Mark first TWO only)** **Any two** (2)
- 2.2.4 Prophase 1 ✓ (1)
- 2.2.5 **Crossing over \*** ✓  
 - occurs during prophase I ✓  
 - Homologous chromosomes ✓  
 - non-sister – chromatids overlap ✓  
 - at points called chiasma ✓ /chiasmata  
 - Genetic material ✓ is exchanged  
 - resulting in new combinations of genetic material ✓  
**(1\* compulsory mark + Any 4)** (5)  
**(10)**



2.3 2.3.1 Three/3 ✓ (1)

2.3.2 **DO NOT MARK THIS QUESTION**

2.3.3 **DO NOT MARK THIS QUESTION**

- 2.3.4
- Individual A is unaffected ✓
  - caused by dominant allele on X chromosome ✓ /  $X^D$
  - Offspring C inherits Y chromosome from individual B ✓ / father
  - and  $X^d$  from individual A / mother ✓

OR

- Individual A has an offspring C who is affected ✓
- Therefore, receiving a recessive allele ✓ /  $X^d$  from individual A
- individual A must have a dominant allele as well ✓
- hence she is unaffected ✓

**Any (3)**

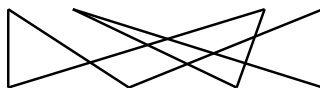
2.3.5 **P<sub>1</sub>** Phenotype Normal male x Normal female ✓

Genotype  $X^D Y$  x  $X^D X^d$  ✓

Meiosis

Gametes  $X^D, Y$  x  $X^D, X^d$  ✓

Fertilisation



**F<sub>1</sub>** Genotype  $X^D X^D$  :  $X^D X^d$  :  $X^D Y$  :  $X^d Y$  ✓

Phenotype **3** normal/unaffected : **1** with Duchene muscular dystrophy ✓ / DMD / affected

There is a **25% chance** ✓\* of offspring having Duchene muscular dystrophy / DMD.

**P<sub>1</sub>** and **F<sub>1</sub>** ✓

Meiosis and fertilization ✓

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

**OR**

**P<sub>1</sub> Phenotype** Normal male x Normal female ✓

**Genotype**  $X^D Y$  x  $X^D X^d$  ✓

|               |         |           |         |
|---------------|---------|-----------|---------|
| Meiosis       | Gametes | $X^D$     | $Y$     |
|               | $X^D$   | $X^D X^D$ | $X^D Y$ |
| Fertilization | $X^d$   | $X^D X^d$ | $X^d Y$ |

1 mark for correct gametes ✓  
1 mark for correct genotypes ✓

**F<sub>1</sub> Genotype**  $X^D X^D$  :  $X^D X^d$  :  $X^D Y$  :  $X^d Y$  ✓

**Phenotype** 3 normal/unaffected : 1 with Duchene muscular dystrophy ✓ /DMD/affected

There is a **25% chance** ✓\* of offspring having Duchene muscular dystrophy /DMD.

P<sub>1</sub> and F<sub>1</sub> ✓

Meiosis and fertilization ✓

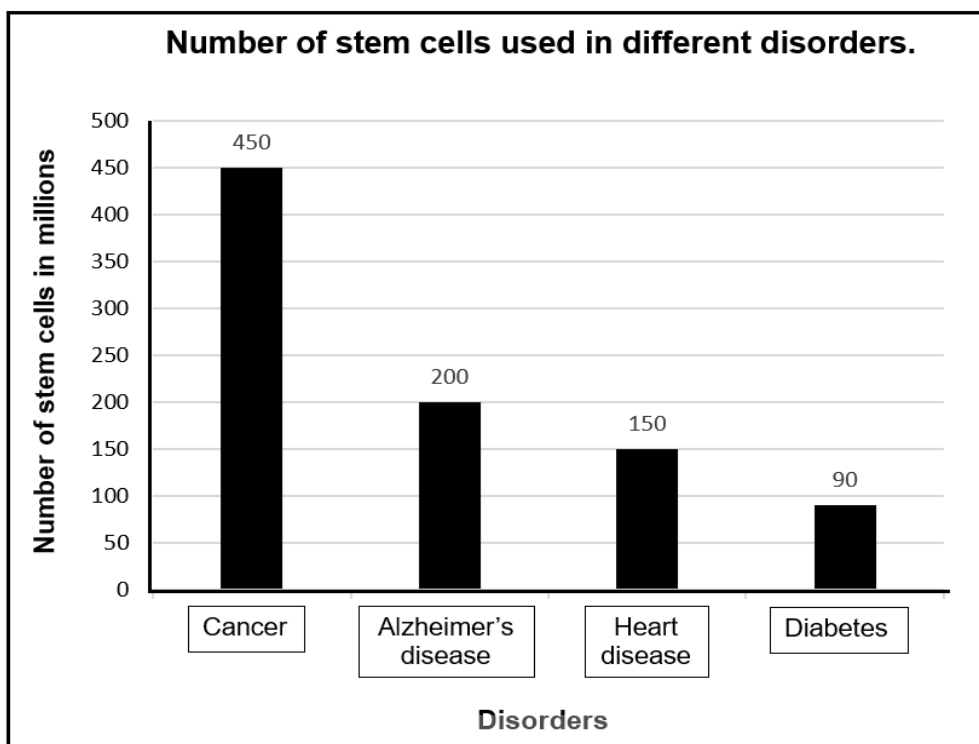
(6)  
**(1\* compulsory mark + Any 5) (10)**

2.4 2.4.1

- It can develop in any type of tissue ✓
- Used for therapeutic purposes ✓
- Treat spinal injuries ✓
- Cultivated tissue cultures to form meat ✓

**Any (1)**

2.4.2





| Criteria   | Mark allocation |
|--|-----------------|
| Type: Bar graph is drawn. (T)                                  | 1               |
| Caption of the graph includes both variables (C)               | 1               |
| Correct labels on X-axis and Y-axis (L)                        | 1               |
| Correct scale for Y-axis<br>Equal width of bars and spaces (S) | 1               |
| Plotting: (P)  |                 |
| 1- 3 bars are plotted correctly                                | 1               |
| All 4 bars are plotted correctly                               | 2               |

(6)  
(7)

- 2.5 2.5.1 (a) Dihybrid cross ✓ (1)
- (b) Involves the inheritance of two characteristics ✓ (1)
- 2.5.2 (a) Tall plant ✓ with yellow fruit ✓ (2)
- (b) ttRr ✓ (1)
- 2.5.3 25 ✓ % (1)

(1)  
(6)  
[45]

**QUESTION 3**

- 3.1 3.1.1 Wearing a facemask increases the carbon dioxide levels in the blood. ✓✓  
 OR  
 Wearing a facemask does not increase the carbon dioxide levels in the blood. ✓✓  
 OR  
 Wearing a facemask does not have any effect on the carbon dioxide levels in the blood. ✓✓ (2)
- 3.1.2 CO<sub>2</sub> levels (in the blood)✓/Carbon dioxide levels (in the blood) (1)
- 3.1.3 The same:  
 - Age ✓  
 - Sex ✓  
 - Level of fitness✓/health  
 - Weight ✓  
 - Levels of activity✓  
**(Mark first TWO only)** (2)
- 3.1.4 – Get permission from school/parents/volunteers. ✓  
 Decide:  
 – which variables need to be controlled.✓  
 – what method will be used.✓  
 – what equipment will be needed.✓  
 – how the result will be recorded.✓  
 – what safety measures will be needed.✓  
 – a date/time when the investigation would be carried out.✓  
**(Mark first ONE only)** (1)
- 3.1.5 - Use more than 8 classmates/ increase sample size. ✓  
 - Repeat the investigation. (1)  
**(Mark first ONE only)** (1)
- 3.1.6 **DO NOT MARK THIS QUESTION** (7)
- 3.2 3.2.1 (a) E✓ – Epididymis ✓ (2)
- (b) B✓ - Seminal vesicle ✓  
 OR  
 C✓ - Prostate gland ✓  
 OF  
 D✓ - Cowper's gland✓ (2)
- 3.2.2 **DO NOT MARK THIS QUESTION**

- 3.2.3 - The sperm would not be transported to the urethra✓/ semen would not have any sperm present,  
 - Without the sperm, fertilisation cannot take place✓  
 - and therefore, pregnancy cannot occur ✓ (3)  
**(7)**
- 3.3 3.3.1 28 days ✓ (1)
- 3.3.2 Oestrogen ✓ (1)
- 3.3.3 Corpus luteum ✓ (1)
- 3.3.4 Endometrium ✓ (1)
- 3.3.5 - If the ovum is not fertilised, the corpus luteum disintegrates✓/shrink  
 - secretion of progesterone decreased/drop✓  
 - Low levels of progesterone stimulates✓ the production of FSH  
 - to develop a new follicle✓  
 - and for menstruation to start. ✓ **Any** (4)  
**(8)**
- 3.4 - Spermatogenesis takes place under the influence of testosterone✓  
 - in the seminiferous tubules/testes✓  
 - diploid cells ✓  
 - undergo meiosis✓  
 - to form haploid sperm cells✓ (5)
- 3.5 **Pupillary mechanism / pupil reflex ✓**  
 - Radial muscles ✓of the iris contract✓  
 - Circular muscles✓ of the iris relax✓  
 - Pupil dilates / widens / gets bigger ✓  
 - and more light enters the eye✓ **Any** (5)  
**(5)**
- 3.6 3.6.1 Reflex ✓action (1)
- 3.6.2 It protects the body ✓from further injury/ prevents harm to body (1)
- 3.6.3 A✓ – Sensory neuron✓/afferent neuron (2)
- 3.6.4 - The transmission of impulses is accelerated✓  
 - It insulates the nerve fibres✓ /one-way transmission of impulses. **Any** (1)
- 3.6.5 Sensory neuron > interneuron > motor neuron ✓✓  
**(TWO marks ONLY if the sequence is correct)** (2)
- 3.6.6 - The spinal cord shortens reaction time by sending the impulse directly to the effector✓  
 - The brain delays the reaction causing ✓  
 - injury /death✓ (3)



- 3.6.7
- The myelin sheaths are damaged ✓/worn out
  - This will cause a slow transmission of impulses ✓
  - and slow reaction time ✓

**Any** (2)  
(12)  
[44]

**TOTAL SECTION B: 89**  
**GRAND TOTAL: 137**