



# Basic Education

KwaZulu-Natal Department of Education  
REPUBLIC OF SOUTH AFRICA

**JUNE PRE-EXAMINATION 1 MEMORANDUM**

**LIFE SCIENCES**

**JUNE 2023**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**MARKS: 160**

**N.B. This memorandum consists of 10 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.

**SECTION A**

**QUESTION 1**

1.1

1.1.1 B ✓✓

1.1.2 A ✓✓

1.1.3 A ✓✓

1.1.4 D ✓✓

1.1.5 B ✓✓

1.1.6 B ✓✓

1.1.7 B ✓✓

1.1.8 B ✓✓

1.1.9 D ✓✓

1.1.10 C ✓✓

1.1.11 B ✓✓

1.1.12 C ✓✓

(2 x 12) (24)

1.2

1.2.1 tRNA ✓ /transfer RNA

1.2.2 Cloning ✓

1.2.3 Stem cells ✓

1.2.4 Incomplete dominance ✓

1.2.5 Artificial selection ✓ /selective breeding

1.2.6 Chiasma ✓

1.2.7 Ribosome ✓

1.2.8 Haploid ✓

1.2.9 LH ✓ / Luteinizing hormone

1.2.10 Corpus callosum ✓

1.2.11 Umbilical artery ✓

1.2.12 Grommets ✓

1.2.13 Parasympathetic ✓ nervous system

1.2.14 Choroid ✓

1.2.15 Karyotype ✓

1.2.16 Oestrogen ✓

(1 x 16) (16)

1.3



- 1.3.1 A only ✓
- 1.3.2 Both A and B ✓
- 1.3.3 Both A and B ✓
- 1.3.4 B only ✓
- 1.3.5 B only ✓
- 1.3.6 Both A and B ✓
- 1.3.7 B only ✓
- 1.3.8 Both A and B ✓
- 1.3.9 B only ✓
- 1.3.10 None ✓



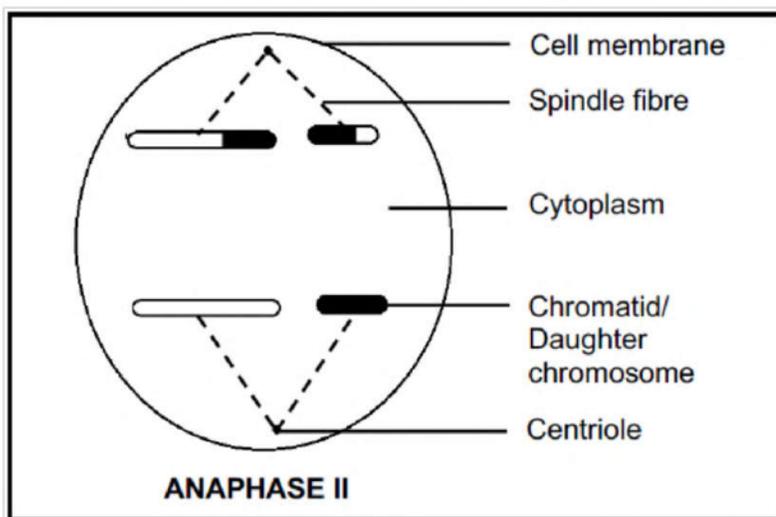
(1 x 10) (10)

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

2.1

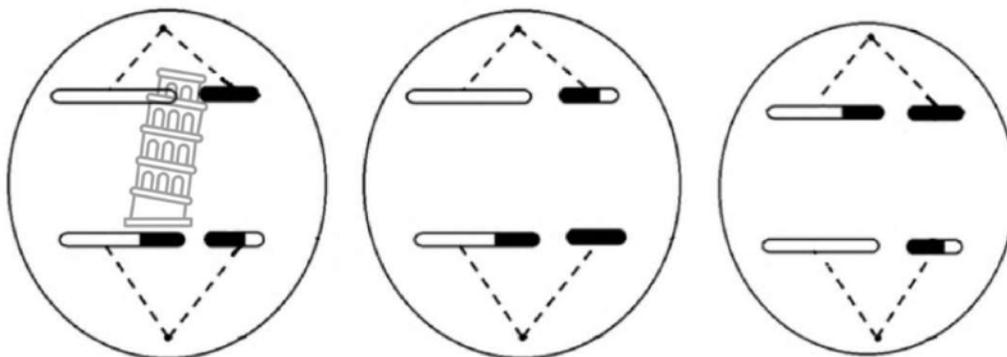
- 2.1.1 (a) 46 ✓ (1)
- (b) 44 ✓ (1)
- (c) 2 ✓ (1)
- 2.1.2. 23 ✓ (1)
- 2.1.3 Male ✓ (1)

2.2



OR

ANY ONE OF THE FOLLOWING ARRANGEMENTS INCLUDING CORRECT LABELS



**MARK ALLOCATION FOR DIAGRAM**

Correct phase drawn/chromatids separating ( <b>P</b> )	1
Correct shading of chromatids ( <b>S</b> )	1
Correct number and size of individual chromatids/daughter chromosomes (2 short and 2 long) ( <b>N</b> )	1
Any TWO correct labels	2
<b>TOTAL</b>	<b>5</b>

(5)  
(10)

2.3 2.3.1 (i) Homologous chromosomes✓/Bivalent

(1)

(ii) Centromere✓

(1)

(iii) Chiasma✓

(1)

(iv) Chromatid✓

(1)

2.3.2 It holds the (two) chromatids✓ together

(1)

2.3.3 (a) Crossing over✓

(1)

(b) Prophase 1✓

2.3.4 Introduces variation✓

(1)

(8)

2.4 2.4.1 A - Urethra✓

(1)

B - Vas deferens✓/sperm duct

(1)

F - Fallopian tube✓/oviduct

(1)

2.4.2 (a) Protects the sperm cell against the acidic environment of the vagina✓

-Increases the motility of the sperm✓

(Mark first ONE only)

Any

(1)



- b) Place for foetus to develop✓  
 - Maintain pregnancy✓  
 - Assist in childbirth✓  
 - Protects the foetus✓/prevents infections  
 - Passage for sperm cells between vagina and fallopian tubes✓  
 (Mark first ONE only) Any (1)
- (c) -Connects the ovaries to the uterus✓  
 -Transports egg cells from the ovary✓  
 -It is the site of fertilisation✓  
 (Mark first ONE only) Any (1)
- 2.4.3 (a) D✓ (1)  
 (b) G✓ (1)
- 2.4.4 -Spermatogenesis✓ (1)  
 -Oogenesis✓ (1)
- 2.4.5 -Receives the penis✓ during sexual intercourse (1)  
 -Serves as a birth canal✓ (1)
- (12)
- 2.5 - In the fallopian tubes✓  
 - One sperm cell makes contact with the ovum's membrane✓  
 -The nucleus of the sperm enters the ovum✓  
 - Then the ovum membrane cannot be penetrated by other sperms✓  
 - The nucleus of the sperm fuses✓  
 -With the nucleus on the ovum✓  
 - To form a diploid zygote✓ Any 5 (5)
- 2.6 - Diploid cells in the ovary undergo mitosis✓  
 - to form numerous follicles✓  
 - At the onset of puberty✓  
 - and under the influence of FSH✓  
 - one cell inside a follicle enlarges✓ and  
 - Of the four cells that are produced, only one survives to form  
 A haploid ovum✓ Any 5 (5)
- (9)

**QUESTION 3**

3.1.

- 3.1.1 (i) Cerebrum✓ (1)
- (ii) Medulla oblongata✓ (1)
- (iii) Eustachian tube✓ (1)

3.1.2 Round window✓ (2)

3.1.3 Hair cells✓/Organ of Corti (1)

3.1.4 - The pinna of the ear traps sound waves✓

- The auditory canal directs the sound waves to the tympanic membrane✓
- The sound waves cause the tympanic membrane to vibrate✓
- The vibrations of the tympanic membrane cause the ossicles to vibrate✓
- The ossicles pass the vibrations to the oval window✓
- The vibration of the oval window cause pressure waves in the inner ear✓/perilymph/endolymph
- The pressure waves stimulate the organ of Corti✓
- The organ of Corti converts the stimuli to nerve impulses✓
- The auditory nerve transmits the impulses
- to the cerebrum for interpretation✓

Any 6 (6)

**(12)**

3.2

- 3.2.1 (a) Zygote✓ (1)
- (b) Morula✓ (1)
- (c) Placenta✓ (1)

- 3.2.2 (a) Fertilisation✓ (1)
- (b) Implantation✓ (1)

- 3.2.3 (a) 46✓ /23 pairs (1)
- (b) 23✓ (1)



**(7)**

- 3.3 3.3.1 Motor neuron✓ (1)
- 3.3.2 (a) Nucleus / nuclear membrane✓ (1)
- (b) Cytoplasm✓ (1)
- (c) Dendrite✓ (1)
- 3.3.3 (a) C✓ – Axon✓ (2)
- (b) D✓ – Myelin sheath✓ (2)
- 3.2.4 Multiple Sclerosis✓ (1)

- 3.3 - The receptor/ finger receives the stimulus of the heat✓ / pain  
 - and converts it into an impulse✓  
 - The sensory neuron carries the impulse✓ from the receptor  
 - to the interneuron✓ connector neuron in the spinal cord  
 - The interneuron transmits the impulse to the motor neuron✓  
 - The motor neuron carries the impulse to the effector✓ / muscle  
 - to move the finger away✓ from the hot pot

**Any 6 (6)**  
**(15)**

- 3.4 3.4.1 (a) Hypophysis✓ / Pituitary gland (1)  
 (b) Adrenal gland✓ (1)
- 3.4.2 (a) D✓ - Testis✓ (2)
- (b) C✓ - Pancreas✓ (2)
- (c) A✓ - Hypophysis✓ / Pituitary gland (2)
- (8)**

- 3.5 - The hypothalamus is stimulated✓  
 - and sends impulses to the blood vessels of the skin. ✓  
 - Blood vessels dilate✓ / blood vessels become wider/vasodilation occurs.  
 - More blood flows to the surface of the skin.  
 - More heat is lost, ✓  
 - through radiation✓ from the skin.  
 - More blood is sent to the sweat glands. ✓  
 - Sweat glands become more active. ✓ / More sweat is released.  
 - Evaporation of the sweat cools (the skin).

**Any 6 (6)**

- 3.6 3.6.1 (a) Suspensory ligament✓ (1)  
 (b) Iris✓ (1)
- 3.6.2 Protects the eye✓ (1)
- 3.6.3 - Ciliary muscles relax✓ (1)



- Suspensory ligaments become taut✓
- Tension on the lens increases✓
- The lens becomes less convex✓ / flattened
- The refractive power of the lens is decreased✓ / light rays are bent less
- Light rays are focussed on the retina✓
- To form a clear image

Any 4

(4)

(7)

3.7

3.7.1  $I^A$ ✓,  $I^B$ ✓,  $i$ ✓

(3)

3.7.2 2✓

(1)

3.7.3 - Any individual inherits one allele✓

- from each parent✓
- Each child has an equal✓ or 25% chance of having
- any blood group✓ / A, B, AB or O

(4)

3.7.4 - The pair of alleles on homologous chromosomes separate✓

- during meiosis✓ / anaphase/ gamete formation, so that
- only one allele of each pair is present in the gamete✓ / offspring can acquire one allele from each parent

(3)



