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.

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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.

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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✓ / Leteinizing hormone

1.2.10 Corpus callosum✓

1.2.11 Umblical 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)

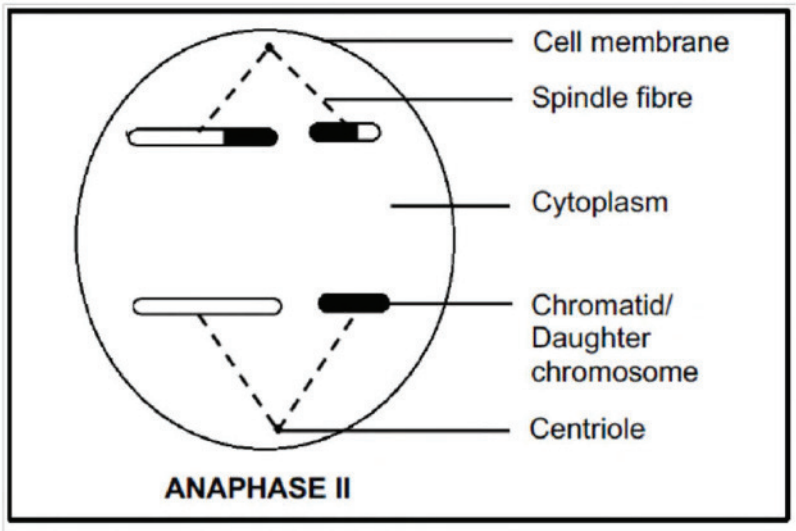
(b) 44✓ (1)

(c) 2✓ (1)

2.1.2. 23✓ (1)

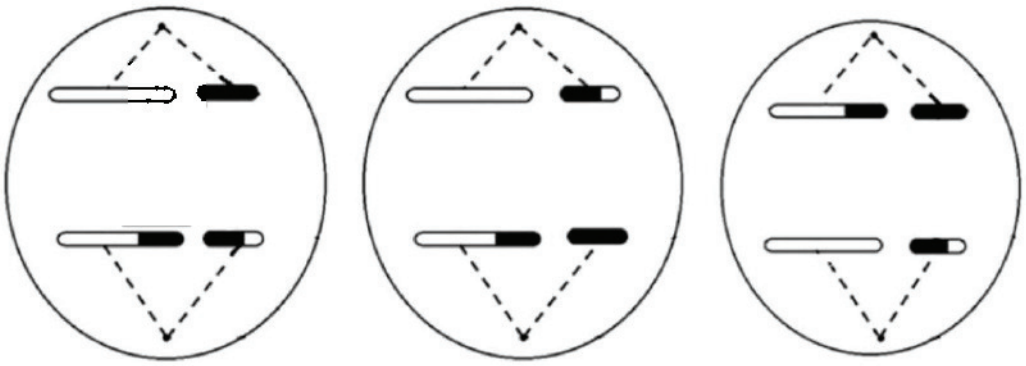
2.1.3 Male✓ (1)

2.2



OR

ANY ONE OF THE FOLLOWING ARRANGEMENTS INCLUDING CORRECT LABELS



MARK ALLOCATION FOR DIAGRAM

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

(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 G✓ 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)

3.7.5

P_1	Phenotype	Male	x	Female✓
	Genotype	XY	x	XX✓

Meiosis

Fertilisation

Gametes	X	Y
X	XX	XY
X	XX	XY

1 mark for correct gametes
1 mark for correct genotypes

F_1 Phenotype ***50% males**✓ / 50% females

P_1 and
F_1✓
Meiosis and fertilisation✓ ***Compulsory 1** + Any 5

OR

P_1	Phenotype	Male	x	Female✓
	Genotype	XY	x	XX✓

Meiosis

G/gametes X, Y x X, X✓

Fertilisation

F_1 Genotype XX; XX; XY XY✓

Phenotype ***50% males**✓ / 50% females

P_1 and
F_1✓
Meiosis and fertilisation✓ ***Compulsory 1** + Any 5 **(6)**

TOTAL MARKS: [160]