



education

**MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA**

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES
EASY TO SCORE
PAPER 2
MARKING GUIDELINES
OCTOBER 2021**

This marking guideline consists of 16 pages

1.1 CODE OF LIFE

- 1.1.1 C✓✓
- 1.1.2 B✓✓
- 1.1.3 B✓✓
- 1.1.4 B✓✓
- 1.1.5 C✓✓
- 1.1.6 C✓✓
- 1.1.7 D✓✓
- 1.1.8 C✓✓
- 1.1.9 B✓✓

MEIOSIS

- 1.1.10 C✓✓
- 1.1.11 B✓✓

GENETICS

- 1.1.12 C✓✓
- 1.1.13 D✓✓
- 1.1.14 B✓✓
- 1.1.15 C✓✓
- 1.1.16 C✓✓
- 1.1.17 D✓✓
- 1.1.18 A✓✓
- 1.1.19 A✓✓
- 1.1.20 D✓✓
- 1.1.21 C✓✓
- 1.1.22 C✓✓
- 1.1.23 C✓✓
- 1.1.24 D✓✓
- 1.1.25 B✓✓
- 1.1.26 A✓✓
- 1.1.27 A✓✓

EVOLUTION

- 1.1.28 D✓✓
- 1.1.29 C✓✓
- 1.1.30 D✓✓
- 1.1.31 A✓✓
- 1.1.32 C✓✓
- 1.1.33 B✓✓
- 1.1.34 C✓✓
- 1.1.35 A✓✓
- 1.1.36 B✓✓
- 1.1.37 C✓✓
- 1.1.38 D✓✓
- 1.1.39 C✓✓
- 1.1.40 C✓✓

- 1.1.41 B✓✓
- 1.1.42 B✓✓
- 1.1.43 A✓✓
- 1.1.44 C✓✓
- 1.1.45 C✓✓
- 1.1.46 C✓✓
- 1.1.47 C✓✓
- 1.1.48 B✓✓
- 1.1.49 A✓✓
- 1.1.50 C✓✓
- 1.1.51 B✓✓
- 1.1.52 D✓✓
- 1.1.53 A✓✓
- 1.1.54 C✓✓
- 1.1.55 C✓✓
- 1.1.56 D✓✓

- 2.1 2.1.1 Ribosomes✓
- 2.1.2 Peptide bond✓
- 2.1.3 Replication ✓
- 2.1.4 Non disjunction ✓
- 2.1.5 Extinction✓
- 2.1.6 Hypothesis ✓
- 2.1.7 tRNA✓
- 2.1.8 Uracil ✓
- 2.1.9 Biotechnology ✓
- 2.1.10 Continuous✓variation
- 2.1.11 Bipedalism✓
- 2.1.12 Deoxyribose✓
- 2.1.13 Haemophilia✓
- 2.1.14 Paleontology ✓

- 2.1.15 Biogeography ✓
- 2.1.16 Hominidae ✓
- 2.1.17 Locus ✓
- 2.1.18 Australopithecus ✓
- 2.1.19 Pedigree diagram ✓
- 2.1.20 Peptide bond ✓
- 2.1.21 Interphase ✓
- 2.1.22 *Homo habilis* ✓
- 2.1.23 Stem cells ✓
- 2.1.24 Peptide bond ✓
- 2.1.25 Hydrogen bonds ✓
- 2.1.26 Genome ✓
- 2.1.27 Cultural evidence ✓
- 2.1.28 Speciation ✓
- 2.1.29 Haemoglobin ✓
- 2.1.30 Foramen magnum ✓
- 2.1.31 Allele ✓
- 2.1.32 Discontinuous ✓
- 2.1.33 Gonosomes ✓
- 2.1.34 Uracil ✓
- 2.1.35 Punctuated equilibrium ✓
- 2.1.36 Extinction ✓
- 2.1.37 Australopithecus ✓
- 2.1.38 Ribosome ✓
- 2.1.39 Locus ✓

- 2.1.40 Ribose✓
- 2.1.41 Biotechnology ✓
- 2.1.42 Homologous ✓
- 2.1.43 Incisors✓
- 2.1.44 Cranium✓
- 2.1.45 Autosomes✓
- 2.1.46 Chromatin✓ network
- 2.1.47 Karyotype
- 2.1.48 Prognathus ✓

- 1.3.1 B only✓✓
- 1.3.2 B only✓✓
- 1.3.3 A only✓✓
- 1.3.4 A only✓✓
- 1.3.5 A only✓✓
- 1.3.6 B only✓✓
- 1.3.7 BOTH A AND B✓✓
- 1.3.8 A only✓✓
- 1.3.9 NONE✓✓
- 1.3.10 A only✓✓
- 1.3.11 B only✓✓
- 1.3.12 A only✓✓
- 1.3.13 BOTH A AND B✓✓
- 1.3.14 NONE✓✓
- 1.3.15 B only✓✓
- 1.3.16 A only ✓✓
- 1.3.17 B only✓✓
- 1.3.18 A only✓✓

1.3.19 B only✓✓

1.3.20 B only✓✓

1.3.21 A only✓✓

1.3.22 B only✓✓

1.3.23 Both A and B✓✓

1.3.24 A only✓✓

1.3.25 Both A and B✓✓

1.3.26 Both A and B✓✓

1.3.27 A only✓✓

1.3.28 A only✓✓

1.3.29 A only✓✓

1.3.30 NONE✓✓

MEIOSIS

- | | | | |
|-----|-------|--|-----|
| 4.1 | 4.1.1 | (a) Prophase I✓ | (1) |
| | | (b) Metaphase II✓ | (1) |
| | 4.1.2 | (a) Centriole✓ | (1) |
| | | (b) Nuclear membrane✓/(nucleus) | (1) |
| | | (c) Homologous pair✓/Bivalent | (1) |
| | 4.1.3 | (a) - Forms spindle✓✓fibres | (2) |
| | | (b) Carries genetic✓/hereditary material | (1) |
| | 4.1.4 | Haploid✓ | (1) |
| | 4.1.5 | Crossing over✓ | (1) |

(10)

4.2	4.2.1	(a) 46✓ (b) 44✓ (c) 2✓	(1) (1) (1)
	4.2.2	23✓	(1)
	4.2.3	Male✓	(1) (5)
4.3	4.3.1	Homologous chromosomes✓	(1)
	4.3.2	45✓	(1)
	4.3.3	Gonosomes✓	(1)
	4.3.4	The presence of a Y chromosome✓/XY chromosome	(1)
	4.3.5	Chromosome✓mutation	(1)
4.3.6	-	Non-disjunction occurred✓/A homologous pair of chromosomes failed to separate - at position 21✓ - during Anaphase✓ - resulting in one gamete with 24 chromosomes✓/an extra chromosome/2 chromosomes at position 21 -The fertilisation of this gamete with a normal gamete✓/gamete with 23 chromosomes/1 chromosome at position 21 - results in a zygote with 47 chromosomes✓ - There are 3 chromosomes✓/an extra chromosome at position 21/ this is Trisomy 21	(6) (11)
4.4	4.4.1	W Cell membrane ✓/ Plasmalemma X Homologous chromosomes✓/Bivalent	(1) (1)
	4.4.2	(a) 4✓ (b) 2 ✓	(1) (1)
	4.4.3	D✓	(1)
	4.4.4	Y Holds the sister chromatids together✓ Z Pulls chromosomes/chromatids to the poles✓	(2)
	4.4.5	Telophase II✓	(1) (8)

4.5	4.5.1	23✓	(1)
	4.5.2	(a) Centromere✓	(1)
		(b) Chiasma✓/chiasmata	(1)
	4.5.3	Ovary✓	(1)
	4.5.4	(a) Crossing over✓	(1)
		(b) Prophase I✓	(1)
		(c) ova✓/gametes/sex cells	(1)
	4.5.5	C → B → A✓ (correct sequence)	(1)
			(8)
4.6	4.6.1	(a) Metaphase I✓	(1)
		(b) Telophase I✓	(1)
	4.6.2	(a) B✓	(1)
		(b) C✓	
		(c) D✓	(1)
	4.6.3	Testis✓	(1)
			(6)
4.7	4.7.1	(a) Autosomes✓	(1)
		(b) Gonosomes✓ /sex chromosomes	(1)
	4.7.2	Male✓	(1)
	4.7.3	- There is a Y-chromosome✓/XY chromosomes -at chromosome pair 23✓	(2)
4.7.4	One comes from the male parent✓ and the other comes from the female parent✓		
	OR		
	One comes from the sperm✓ and the other comes from the ovum✓		(2)
			(7)
4.8	4.8.1	(a) Down syndrome✓/ Trisomy 21	(1)
		(b) Anaphase✓ I/ II	(1)
		(c) Chromosomal✓ mutation	(1)
	4.8.2	Autosomes✓	(1)
			(4)

GENETICS

- 5.1 5.1.1 (a) Big✓ and green✓ fruit (2)
- (b) BG, Bg, bG, bg✓✓ (2)
- 5.1.2 0✓ %✓ (2)
- (6)**
- 5.2 5.2.1 (a) White✓ fur (1)
- (b) Black✓ fur (1)
- 5.2.2 (a) 1✓ and 3✓ (2)
- (Mark first TWO only)**
- (b) 1✓ (1)
- (5)**
- 5.3 5.3.1 High yield✓
Short stem✓ (2)
- 5.3.2 hT✓ (1)
- (Mark first ONE only)**
- 5.3.3 HHtt✓, Hhtt✓ (2)
- (Mark first TWO only)**
- 5.3.4 Does not break easily in windy conditions✓/to carry a bigger yield/
easier to harvest Any (1)
- 5.3.5 The plant breeder must cross✓ plants of variety A (HHtt) with
plants of variety A✓(HHtt) (2)
- (8)**
- 5.4 5.4.1 (a) BbTt✓✓ (2)
- (b) Black coat✓ short tail✓ (2)
- (c) BbTt✓ (1)
- 5.4.2 0✓% (1)
- 5.4.3 Bt✓ bT✓ (2)
- (MARK FIRST TWO ONLY)** (2)
- (8)**

5.5	5.5.1	Three✓/3	(1)
	5.5.2	I ^A ✓ and I ^B ✓	(2)
			(3)
5.6	5.6.1	(a) Genes✓/alleles	(1)
		(b) Monohybrid✓	(1)
	5.6.2	Ovary✓/gynaecium/pistil/ovule	(1)
	5.6.3	(a) 2✓/Two (b) 4✓/Four	(1) (1)
	5.6.4	(a) Violet✓ (b) Short✓	(1) (1)
	5.6.5	2✓/Two	(1)
			(8)

5.7

5.7.1 - Crossing over✓

- Random arrangement of chromosomes✓/
Independent/random assortment of chromosomes
 - Random fertilisation✓
 - Random mating✓
- } OR
meiosis✓

Any 3

(3)

(Mark first THREE only)

- 5.7.2 - Continuous variation occurs when there is a range of phenotypes for the same characteristic✓/has intermediate forms,
- whereas discontinuous variation occurs when phenotypes fit into separate or distinct categories✓/with no intermediate forms

(2)

(5)

- 5.8 5.8.1 Y✓ and Z✓
(Mark first TWO only)

(2)

- 5.8.2 Y – Tau✓
Z – Chaka✓

(2)

- 5.8.3 I^AI^A✓
I^Ai✓
(Any order)

(2)

(6)

- 5.9 5.9.1 - The manipulation of genetic material✓
- to produce a genetically different✓/identical organism/repair tissues and organs
- OR**
- The manipulation of genetic material✓
-to produce something of benefit to humans✓/society (2)

- 5.9.2 - A plasmid/ circular DNA is removed from the bacterial cell✓
- It is cut✓ using enzymes
-The insulin gene is removed from a human cell✓ and
-inserted into the plasmid✓to form the recombinant DNA (4)

- 5.9.3
- Bacteria reproduce very rapidly✓ ,
 - forming many copies of the gene✓ in a short period of time
- OR**
- Bacteria reproduce asexually✓/by mitosis,
 - forming identical copies of itself✓
- OR**
- The bacterial DNA is in the form of a plasmid✓ ,
 - for easy insertion of genes✓
- OR**
- Bacteria exist everywhere✓ ,
 - so they can be obtained with no difficulty✓/expense
- OR**
- Bacteria are simple organisms✓ ,
 - so their use is unlikely to raise ethical issues✓
- Any 1 x 2 (2)

- 5.9.4
- Expensive✓/ research money could be used for other needs
 - Interfering with nature✓/ immoral
 - Potential health impacts✓
 - Unsure of long-term effects✓
- Any 3 (3)
- (Mark first THREE only) (11)**

CODE OF LIFE

- 6.1 6.1.1 mRNA✓/messenger RNA (1)
- 6.1.2 (a) Nitrogenous base✓ (1)
(b) Ribose✓ (1)
(3)

6.2	6.2.1	DNA✓/Deoxyribonucleic acid	(1)
	6.2.2	Nucleus✓/chromosome Mitochondria✓ (Mark first TWO only)	(2)
	6.2.3	(a) Nucleotide✓ (b) Guanine✓ (c) Phosphate✓ (d) Hydrogen✓ bond	(1) (1) (1) (1)
	6.2.4	Double helix✓	(1)
	6.2.5	DNA replication✓	(1) (9)
6.3	6.3.1	Translation✓	(1)
	6.3.2	(a) Ribosome✓ (b)mRNA✓/messenger RNA (c) Peptide✓	(1) (1) (1)
	6.3.3	(a) C✓ (b) B✓ (c) D✓	(1) (1) (1) (7)
6.4	6.4.1	(a) Ribosome✓ (b) W – mRNA✓ Y – tRNA✓ (c) Nucleotide ✓	(1) (2) (1)
	6.4.2	(a) Cytoplasm✓/endoplasmic reticulum (b) Nucleus✓ /nucleoplasm	(1) (1) (6)

- 6.5 6.5.1 DNA profile✓ (1)
- 6.5.2 Q✓ (1)
- 6.5.3 All the DNA bands match the DNA bands of the blood on the broken glass✓ (1)
- 6.5.4 - Human error could give incorrect results✓
- Only a small amount of DNA was used✓ and may not be reliable
- Framing✓/planting false evidence
- Suspect can have an identical twin✓ with the same DNA profile
(Mark first TWO only) Any 2 (2)
(5)

6.6

Monomer of RNA	Monomer of DNA
Contains the sugar ribose✓	Contains the sugar deoxyribose✓
Contains the nitrogenous base uracil✓	Contains the nitrogenous base thymine✓

(Mark first TWO only)

✓ table

(5)

EVOLUTION

- 7.1 7.1.1 Phylogenetic✓ (1)
- 7.1.2 (a) 5✓ (1)
- 7.1.2 (b) 4✓ (1)
- 7.1.3 (*Paranthropus*) *robustus*✓ and (*Paranthropus*) *boisei*✓ (2)
- 7.1.4 (a) Accept any value in the range 4,3 to 4,5 million years ago✓/mya (1)
- 7.1.4 (b) 1 mya✓ (1)
- 7.1.5 (a) *Homo neanderthalensis*✓ (1)
- 7.1.5 (b) *Homo habilis*✓ (1)
- (9)**

7.2

7.2.1 Hominidae✓ (1)

7.2.2 600✓ cm³ (1)

7.2.3 1,6 million years ago✓/mya (1)

7.2.4 Taung child✓/ } *A.africanus*
 Mrs Ples✓/
 Karabo✓/*A.sediba*
 Little foot✓/*A.prometheus* Any 2 (2)
(Mark first TWO only)

7.2.5 *Homo sapiens*✓ (1)
(6)

7.3 7.3.1 B - Cranium ✓
 C - Brow ridge✓ (2)

7.3.2 Canine✓ (1)

7.3.3 (a) I✓ ; II✓ **(Mark first TWO only)** (2)(b) II✓ **(Mark first ONE only)** (1)(c) III✓ **(Mark first ONE only)** (1)(d) III✓ **(Mark first ONE only)** (1)

7.3.4 C✓ (1)

7.3.5 III → I → II✓✓ (2)

(11)

7.4 7.4.1 (a) - *Sahelanthropus*✓
 - *Australopithecus*✓
 - *Homo*✓ Any 2 (2)
(Mark first TWO only)

(b) - Taung child✓
 - Mrs Ples✓
 - (Little foot)✓ Any 2 (2)
(Mark first TWO only)

(c) *Sahelanthropus*✓ (1)7.4.2 *Homo neanderthalensis*✓ (1)7.4.3 650✓ cm³ (1)

7.4.4 2,0 mya✓/2 000 000 years ago (1)

7.4.5 Genetic✓ evidence Cultural✓ evidence (2)
(Mark first TWO only) **(10)**

7.5	7.5.1	Phylogenetic tree✓	(1)
	7.5.2	4✓	(1)
	7.5.3	(a) <i>Paranthropus</i> ✓	(1)
		(b) <i>Ardipithecus</i> ✓	(1)
		(c) <i>Paranthropus robustus</i> ✓	(1)
	7.5.4	Mrs Ples✓ Taung Child✓ Little Foot✓ (Mark first ONE only)	(Any1) (1)
	7.5.5	<i>H. habilis</i> ✓ <i>H. erectus</i> ✓ <i>H. naledi</i> ✓ (Mark first TWO only)	(Any 2) (2) (8)
7.6	7.6.1	(a) 25✓ mya (accept 24 to 25) (b) 63✓ mya	(1) (1)
	7.6.2	Old World monkeys✓ and apes✓ (MARK FIRST TWO ONLY)	(2)
	7.6.3	Lorises✓	(1) (5)
7.7	7.7.1	Bipedal✓	(1)
	7.7.2	A✓ and B✓	(2)
	7.7.3	Both have a short✓ and wide✓ pelvis	(2)
	7.7.4	Less curved spine✓ /C-shaped spine (Mark first ONE only)	(1) (6)

7.8. Differences between the skulls **T**✓

Humans	African apes
Large cranium✓	Small cranium✓
No cranial ridge✓	Cranial ridge across the top of the cranium✓
Brow ridges are not well developed✓	Brow ridges well developed✓
Foramen magnum in a forward position✓	Foramen magnum in a backward position✓
Jaws less protruding /less prognathous✓	Jaws more protruding/more prognathous✓
Smaller jaws✓	Larger jaws✓
Palate shape more rounded✓	Palate shape more rectangular✓
Teeth arranged on a gentle (round) curve✓	Teeth arranged in a less curved way✓
Smaller spaces between the teeth✓	Larger spaces between the teeth✓
Small canines✓	Large canines✓

(Mark first THREE only) Table1+ Any 3 x 2 **(7)**