



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

JUNE EXAMINATION 2022

MARKING GUIDELINES

LIFE SCIENCES (10831)

9 pages

SECTION A

QUESTION 1

- | | | | | |
|-----|--------|---|----------|------|
| 1.1 | 1.1.1 | D ✓✓ | | |
| | 1.1.2 | B ✓✓ | | |
| | 1.1.3 | A ✓✓ | | |
| | 1.1.4 | A ✓✓ | | |
| | 1.1.5 | C ✓✓ | | |
| | 1.1.6 | B ✓✓ | | |
| | 1.1.7 | A ✓✓ | | |
| | 1.1.8 | C ✓✓ | | |
| | 1.1.9 | A ✓✓ | | |
| | 1.1.10 | C ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Internal ✓ fertilisation | | |
| | 1.2.2 | (Umbilical) vein ✓ | | |
| | 1.2.3 | Mitochondrion ✓/Mitochondria | | |
| | 1.2.4 | Pinna ✓ | | |
| | 1.2.5 | Acrosome ✓ | | |
| | 1.2.6 | Puberty ✓ | | |
| | 1.2.7 | Chromatin ✓ network | | |
| | 1.2.8 | Amniotic ✓ egg | (8 x 1) | (8) |
| 1.3 | 1.3.1 | A only ✓✓ | | |
| | 1.3.2 | B only ✓✓ | | |
| | 1.3.3 | None ✓✓ | (3 x 2) | (6) |
| 1.4 | 1.4.1 | DNA profiling ✓ | | (1) |
| | 1.4.2 | Adult C ✓ | | (1) |
| | 1.4.3 | <ul style="list-style-type: none"> • All bands of adult B and C together ✓ • match all the children's bands ✓ | | |

OR

- He is the only adult that can provide all the DNA bands ✓
with adult B that the children have ✓ (2)

- 1.4.4 • Child 1 and 2 ✓✓ (2)
- 1.4.5 • Tracing missing persons ✓
 • Identify crime suspects ✓
 • Identification of genetic disorders ✓
 • Establishing family relations ✓
 • Matching tissues for organ transplants ✓
 • Identifying dead persons ✓/animals
(Mark first TWO only) (2)
- 1.5 1.5.1 (a) Dihybrid (cross) ✓ (1)
 (b) Involves the inheritance of two characteristics ✓ (1)
- 1.5.2 1 ✓ (1)
- 1.5.3 FfBb ✓ (1)
- 1.5.4 (a) Fluffy tails and brown fur ✓ (1)
 (b) ffBb ✓ (1)
- 1.5.5 $\frac{3}{4}$ ✓✓ **OR** 75% (2)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

- 2.1 2.1.1 (a) Deoxyribose ✓ (1)
- (b) Nucleotide ✓ (1)
- 2.1.2
- The DNA (double helix) unwinds ✓ and
 - unzips ✓ / hydrogen bonds break
 - to form two separate strands ✓
 - Both DNA strands serve as templates ✓
 - to build a complementary DNA ✓ / (A to T and C to G) using free (DNA) nucleotides from the nucleoplasm
 - This results in two identical (DNA) molecules ✓
 - Each molecule consists of one original strand and one new strand ✓ (Any 6 x 1) (6)
- 2.1.3 Met ✓ - Phe ✓ - Cys ✓ (3)
- 2.1.4
- Codon AUG (on the mRNA) changed to AAG ✓
 - Anticodon UAC (on tRNA) changed to UUC ✓
 - which resulted in Lys ✓ being picked by tRNA instead of Met and
 - a different protein was formed ✓ (4)
- 2.2.1 (a) Locus ✓ (1)
- (b) Centromere ✓ (1)
- 2.2.2 Heterozygous ✓ (1)
- 2.2.3 The alleles/letters representing the gene are different. ✓ (1)
- 2.2.4 Similarity:
- They carry the same genes at the same loci ✓ / positions / locations
- Difference:
- They carry different alleles ✓
 - because of crossing over ✓ during meiosis and
 - mutations ✓ / copying errors during DNA replication
- 1 similarity + Any 2 differences** (3)
- 2.3 2.3.1 (a) Zygote ✓ (1)
- (b) Morula ✓ (1)
- 2.3.2 Fertilisation ✓ (1)
- 2.3.3 In the fallopian tubes ✓ / Oviducts (1)

- 2.3.4
- The process is oogenesis ✓
 - 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 undergoes meiosis ✓
 - Of the four cells that are produced, only one survives ✓
 - to form a mature, haploid ovum ✓ (Any 6 x 1)
- (6)

- 2.3.5
- Amniotic fluid acts as a shock absorber and protects the foetus from mechanical injury ✓ /temperature changes/dehydration
 - The placenta serves as a barrier, protecting the foetus from certain diseases ✓
- (2)

2.4 P₁ Phenotype White patch x White patch ✓
 Genotype Hh x Hh ✓

Meiosis G/gametes H, h x H, h ✓

Fertilisation F₁ Genotype HH; Hh; Hh hh ✓

Phenotype 3 White patch: 1 Without white patch ✓*

P₁ and F₁ ✓
 Meiosis and fertilisation ✓

*Compulsory 1 + Any 5

OR

P₁ Phenotype White patch x White patch ✓
 Genotype Hh x Hh ✓

Meiosis

Fertilisation

Gametes	H	h
H	HH	Hh
h	Hh	hh

1 mark for correct gametes
 1 mark for correct genotypes

F₁ Phenotype 3 White patch: 1 Without white patch ✓*

P₁ and F₁ ✓
 Meiosis and fertilisation ✓

* 1 Compulsory + Any 5 (6)

2.5.1 Karyotype ✓ (1)

2.5.2 Autosomes ✓ (1)

2.5.3 Female ✓ (1)

- 2.5.4
- The last pair ✓/chromosome pair 23/gonosomes
 - consist of two X chromosomes ✓/XX
- (2)
- 2.5.5
- During Anaphase ✓ I/II
 - Chromosome pair 21/chromosome failed to separate ✓/
nondisjunction occurred at position 21
 - Resulting in a gamete (daughter cell) with an extra chromosome ✓
at position 21
 - When this gamete was fertilised by a normal gamete ✓
 - The zygote ended up with 3 chromosomes at position 21 ✓
- (5)
[50]

QUESTION 3

- 3.1 3.1.1 (a) Centriole ✓/ Centrosome (1)
- (b) Spindle fibre ✓ (1)
- 3.1.2 Anaphase I ✓ (1)
- 3.1.3 Each chromosome of each homologous pair is being pulled to the opposite poles ✓ (1)
- 3.1.4 3 ✓ (1)
- 3.1.5 • The chromosomes show swapped segments of genetic material ✓ (1)
- 3.1.6 • Introduces genetic variation ✓ in offspring thereby
• improving the chances of survival ✓ (2)
- 3.2 3.2.1 (a) Menstruation ✓ (1)
- (b) Ovulation ✓ (1)
- 3.2.2 (a) Follicle stimulating hormone ✓/FSH (1)
- (b) Progesterone ✓ (1)
- 3.2.3 • Stimulates the development of primary follicles into mature Graafian follicle ✓ (1)
- 3.2.4 • The corpus luteum degenerates ✓ and therefore the progesterone level drops ✓/stops secreting progesterone
• The endometrial lining will no longer be maintained ✓
• This will result in the lining being broken down and shed ✓
• during menstruation ✓
• preventing possible pregnancy ✓
• FSH secretion is no longer inhibited ✓/ FSH levels will increase
• new follicle ✓ starts to develop (Any 5 x 1) (5)
- 3.3 3.3.1 (a) D ✓ – Eustachian tube ✓ (2)
- (b) E ✓ – Round window ✓ (2)
- 3.3.2 Transmits sound vibrations to the middle ear ✓ (1)
- 3.3.3 • They lie on three different planes ✓
• to detect movement in any direction ✓
• fluid moves in at least one of the semi-circular canals ✓
• to stimulate receptors ✓ (Any 3 x 1) (3)

- 3.4
- The receptor receives the stimulus ✓ and
 - converts it into an impulse ✓
 - which is transmitted by the sensory neuron ✓
 - through the dorsal root ✓
 - of the spinal nerve ✓
 - to the spinal cord ✓
 - where the impulse is transferred via the interneuron ✓
 - to the motor neuron ✓
 - which carries the impulse via the ventral root ✓
 - to the effector ✓/muscle/gland
 - The impulse is transferred from one neuron to the next via a synapse ✓
- (Any 7 x 1) (7)

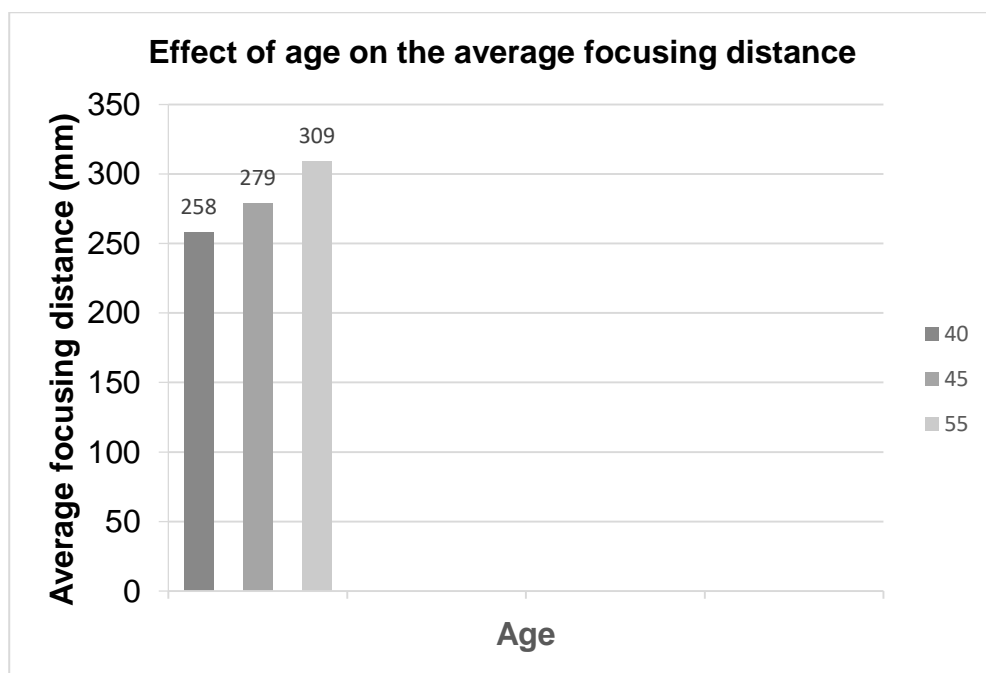
3.5 3.5.1 $X = \frac{292 + 301 + 297}{3}$ ✓

= 297 ✓ mm ✓ (Accept 296,67/ 296,7) (3)

3.5.2 (a) Accommodation ✓ (1)

- (b)
- Ciliary muscles contract ✓
 - Suspensory ligaments slacken ✓/loosen
 - Tension on the lens decreases ✓
 - Lens becomes more convex ✓
 - Light rays become more refracted ✓
 - Light rays are focused on the retina ✓
- (Any 5) (5)

3.5.3



Guideline for assessing the graph

CRITERIA	ELABORATION	MARK
Correct type of graph (T)	Bar graph drawn	1
Caption of graph (C)	Both variables included	1
Axes labels (L)	X- and Y-axis correctly labelled	1
Scale for X-and Y-axis (S)	- Equal space between bars and width of bars for X-axis and - Correct scale for Y-axis	1
Plotting of bars (P)	- Only 3 required bars are drawn	1
	- All 3 required bars drawn correctly	1

If candidates have transposed the axes, they will loose the marks for scaling and labelling.

3.5.4 As the age of the volunteers increase, the longer the average focusing distance. ✓✓

OR

As the age of the volunteers decreases, the shorter the average focusing distance ✓✓

(2)
[50]

TOTAL SECTION B: 100
TOTAL: 150