Western Cape Government
Education

Directorate: Curriculum FET

LIFE SCIENCES

TUTOR GUIDE
2020 TERM 2

Grade 12

PREAMBLE:

This document aims to serve as a guide to support tutors in their presentation of the various topics that form part of the Grade 12 support programme.

Tutors must draw on their teaching experiences in order to adapt, select from, emphasise and expand on sections of the material so that they can facilitate the learning process.

INSTRUCTIONAL DESIGN:

The suggested tutoring design should focus on:

1. Clear, detailed "teaching moments" which cover the content and skills.
2. The use of different teaching methodologies to mediate the material effectively
3. Explaining concepts, processes and terminology.
4. Providing opportunities for learners to practise questions.
5. Explaining the meaning of instructional verbs of questions
6. Explaining the types of questions (multiple choice questions, short questions and essays) asked in question papers and the way in which learners should present their answers.
7. Giving feedback to learners.
8. Consolidation of what has been covered
9. Administration of revision test

RESOURCES:

- Textbooks
- Power Point slides
- Answer Series
- Mind the Gap Study Guide
- Revision Questions

AGENDA/PLAN FOR TEACHING AND LEARNING

What tutor/s should do…	What learners should do…
CONTENT: EVOLUTION, HUMAN REPRODUCTION, REPRODUCTION IN VERTEBRATES Guide and explain to learners how to attempt questions that start with **instructional verbs** e.g. describe, explain, discuss, state, name, interpret, motivate etc. **EXAMPLE:** 'Explain' means that the learner's answer should consist of a statement followed by an elaboration/reason 'Describe' means giving detail of a process/concept in full sentences. Explain challenging **key concepts/processes/skills.** Give feedback after learners have completed questions.	Read examples of questions carefully and underline key verbs/action verbs. Identify what is required and how the question should be attempted/answered. Use of graphic organisers/summaries etc.to plan how to answer questions starting with 'explain', 'describe' etc. Learners complete selected questions on evolution, human reproduction and reproduction in vertebrates
Revision test: Administer the revision test on terminology and items and statements Use results of revision test to identify and explain further challenging **key concepts/processes/skills.**	Complete revision test

ANSWERS TO REVISION QUESTIONS:

Topic: Evolution

1.1 The two types of shrimp/ type A and B did not belong to the same species✓✓/ were different species (2)

1.2 - Individuals that belong to the same species✓are able to interbreed✓
- the two types of shrimps did not mate with each other✓and therefore were unable to interbreed✓ (2)

1.3 To ensure that the results would be reliable✓ (1)

2.

Lamarckism	Darwinism
Variation of the offspring occurs when individuals in the population change✓	Variation in the offspring is inherited✓
Change occurs because of adaptation to the environment✓/Law of use and disuse/ deterministic theory	Natural selection – individuals best suited to the environment survive✓
Individuals in the population change✓	The population as a whole change✓
Acquired characteristics are inherited by offspring✓	Characteristic are passed on from generation to generation to enable individuals to survive in the environment✓

(4 x 2) + 1 for table (9)

3.1 - As the wings were used less ✓
- they became reduced in size✓/less developed
- and could not be used for flying✓
- This acquired characteristic was passed on to the offspring✓ (4)

3.2 - Breeding at different times of the year✓
- Species-specific courtship behaviour✓
- Adaptation to different pollinators✓
- Infertile offspring✓
- Prevention of fertilization✓ (5)

4.1 - It is characterised by long periods of little or no change✓
- alternating with short periods of rapid change✓
- during which new species may form✓ (3)

4.2 They contain toxins✓ which kill the snakes
OR
Too large✓ to be swallowed (1)

4.3 - Having a smaller jaw✓
- means cane toads cannot be consumed✓
- thereby protecting the snakes from ingesting the toxins✓ (3)

4.4 - Since the snakes' jaws were used less ✓/not used
- the snakes developed smaller jaws✓
- This characteristic (of a smaller jaw) was inherited by the offspring✓
- Over many generations the jaw of the snake became smaller✓ (4)

5.1 Type of antibiotic✓ (1)

5.2 - Environmental conditions✓/example
- Amount of antibiotic✓
- Concentration of antibiotic✓
- Time of initial injection of antibiotics✓
- Age of the piglets✓
- Species of piglets✓
- Type food given to piglets✓
- Amount of food given to piglets✓
- Size/mass of piglets✓
- Size of petri dishes✓
- Growth medium in both sets of petri dishes✓
- Sample size of *E. coli* ✓
- Method of measurement✓
- Person doing the measurements✓ Any 2 (2)

5.3 - Investigation was done over a period of six months✓/allowed enough time for bacteria to reproduce
- Took many measurements✓/calculated the average resistance
- Used a large sample size✓/100 piglets Any 2 (2)

5.4 Antibiotic B✓ (1)

5.5 - The average percentage resistance of *E.coli* to antibiotic **B** is lower than its resistance to antibiotic **A**✓therefore
- more *E. coli* bacteria die in the presence of antibiotic **B**✓ (2)

5.6 - There was variation✓ in the population of *E. coli* bacteria
- Some were resistant to antibiotic A✓
- others were not resistant✓
- Those *E. coli* bacteria which were not resistant to antibiotic **A** were killed✓
- Those which were resistant to antibiotic **A** survived and reproduced✓
- passing on the alleles for resistance to their offspring✓
- Over many years the percentage of *E. coli* bacteria dying decreases✓/the resistance increases

Any 5 (5)

6. - The original population of a single species becomes separated✓
- by a geographical barrier✓
- then the population splits into two✓
- There is no gene flow✓between the separated populations
- Natural selection occurs independently✓in each population
- due to exposure to different environmental conditions✓/selection pressures
- The two populations become very different✓from each other
- genotypically and phenotypically✓
- Even if the two populations were to mix again✓
- they will not be able to interbreed✓
- The two populations are now new species✓ Any 6 (6)

7.1 Phylogenetic tree✓ (1)

7.2 4✓ (1)

7.3 (a) *Paranthropus* ✓ (1)

(b) Ardipithecus ✓ (1)

(c) Paranthropus robustus ✓ (1)

7.4 Mrs Ples ✓
Taung Child ✓
Little Foot✓ Any 1 (1)

7.5 *H. habilis*✓
H. erectus✓
H. naledi✓ Any 2 (2)

8.1 Bipedal✓ (1)

8.2 A✓ and B✓ (2)

8.3 Both have a short✓ and wide✓pelvis (2)

8.4 Less curved spine✓/C-shaped spine (1)

9.

Humans	**African apes**
Large cranium✓	Small cranium✓
Brow ridges are not well developed✓	Brow ridges well developed✓
No cranial ridge✓	Cranial ridge across the top of the cranium✓
Jaws less protruding /non-prognathous✓	Jaws more protruding/prognathous✓
Small canines✓	Large canines✓
Foramen magnum in a forward position✓	Foramen magnum in a backward position✓
Palate shape more rounded✓	Palate shape more rectangular✓

Table 1 + (3 x 2) (7)

10.1 A✓ (1)

10.2 Bipedal organisms have a short✓ and wide✓ pelvis to support the upper body (2)

10.3

***Homo sapiens* (A)**	**Primates(B)**
Smaller canines✓	Larger canines✓
Smaller spaces between the teeth✓/no diastema	Larger spaces between the teeth✓/diastema
Jaws with teeth on a gentle/round curve✓	Jaws with teeth in a rectangular shape✓
Non prognathous✓	Prognathous✓

Table 1 + (3 x 2) (7)

10.4 - Wider view of their surroundings✓ to find food/avoid predators✓
- hands were free✓ to carry young/use tools/fight/prepare food✓ (4)

11. - Freely rotating arms✓
- Long upper arms✓
- Rotation around elbow joints✓
- Opposable thumbs✓
- Bare fingertips✓/nails instead of claws
- Five fingers✓/pentadactyl limb
- Fingerprints present✓ Any 4 (4)

12.1 X – foramen magnum✓ (1)

Y – canines✓ (1)

12.2 - The more forward position of the foramen magnum✓/ X
- allows the spinal cord to enter vertically✓
- This acts as an axis for the skull✓
- making it favourable for bipedalism✓/ an upright position Any 3 (3)

12.3 (a) B✓ (1)
(b) A✓ (1)

12.4 - There is an increase✓
- in the cranium size✓from organism **B** to organism **C**
- This will allow it to house a larger brain✓/ cerebrum which suggests greater intelligence (3)

12.5 (a) - The spine changed from C-shaped to more curved ✓/ s-shape,
- which provides better support for bipedalism✓ (2)

(b) - The pelvis changed from being long and narrow to shorter and wider✓,
- to support the body weight in an upright position✓ (2)

12.6 - The oldest fossils of *Homo erectus* were found in Africa✓,
- while the younger fossils were found in other parts of the world✓
- suggesting that *Homo erectus* originated in Africa✓ Any 2 (2)

Topic: Human reproduction:

1.1 (a) Pituitary gland✓/hypophysis (1)

(b) Graafian follicle✓ (1)

(c) Ovulation✓ (1)

(d) Corpus luteum✓ (1)

1.2 Oestrogen levels will remain low✓/decrease (1)

1.3 - Stimulates ovulation✓/
- Stimulates the conversion of the remains of the Graafian follicle to a corpus luteum✓ (1)

2.1 Oogenesis✓ (1)

2.2 - At the end of the process in DIAGRAM I/oogenesis, one✓ gamete/ovum forms/three cells degenerate
- At the end of the process in Diagram II/spermatogenesis four✓ gametes/sperm form/none of the cells degenerate (2)

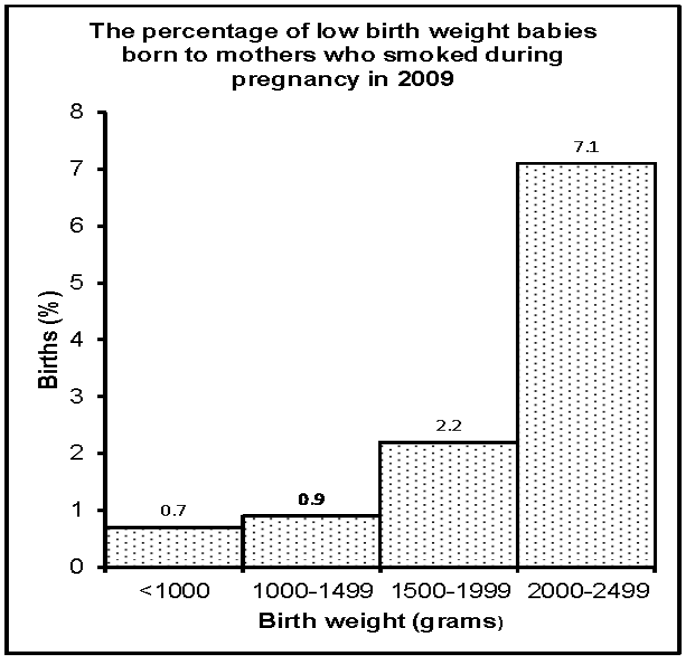
2.3 Testes✓/seminiferous tubules (1)

2.4 (a) 23✓ (1)
(b) 23✓ (1)

2.5 - Crossing over✓
- Random arrangement of chromosomes✓ (2)

2.6 - This will result in multiple births✓/There will be increased chances of fertilisation
- which will lead to an increase in human population✓ (2)

3.1



Mark allocation of the graph

Criteria	Mark Allocation
Histogram drawn (bars must be touching)	1
Title of graph (has both variables)	1
Correct label and unit for X-axis and Y-axis	1
Correct scale for Y-axis and X-axis and width of the bars	1
Drawing of the graph	1: 1 to 3 bars drawn correctly 2: All 4 bars drawn correctly

(6)

3.2 Babies that weigh 2 500 g or more are considered to be of a normal/healthy birth weight ✓ (1)

3.3 The total percentage of low birth weight babies born to mothers who smoked was higher than those born to mothers who did not smoke✓✓

OR

The total percentage of low birth weight babies born to mothers who did not smoke was lower than those born to mothers who smoked✓✓ (2)

3.4 - Chemicals dissolved in the mother's blood✓
- are able to move across the placenta✓/and through the umbilical cord into the babies' blood
- by diffusion✓ Any (2)

4.1 - The high levels of progesterone✓ in the pills
- will inhibit the pituitary gland from secreting FSH✓
- Therefore no follicle will develop✓and
- no oestrogen will be secreted✓ (4)

4.2 - The increase in the progesterone level✓
- indicates that corpus luteum has been formed✓ (2)

4.3 - Women will stay in the habit of taking a pill every day✓/will not forget to take the progesterone containing pills
- To allow menstruation to occur ✓ Any (1)

5.1 - Low levels of progesterone ✓
- stops the inhibition of FSH ✓
- to begin the development of a primary follicle ✓ (3)

5.2 - Oestrogen level continues to increase ✓ (1)

5.3 - LH stimulates the conversion of the Graafian follicle ✓
- into the corpus luteum ✓ therefore the decrease in oestrogen

OR

- The Graafian follicle stops functioning ✓/ becomes empty after ovulation ✓ therefore the decrease in oestrogen
(2)

5.4 - Corpus luteum degenerates ✓
- Progesterone levels drop ✓
- and hence the endometrium will not be maintained ✓ Any (2)

5.5 - Diploid cells in the ovary ✓/ germinal epithelium
- undergo mitosis ✓ under the influence of FSH
- Primary/numerous follicles ✓are formed
- These undergo meiosis✓
- to form haploid cells ✓
- One cell develops into an ovum ✓ inside the Graafian follicle
Any (5)

6. **Secretion and involvement of hormones**
- FSH✓ (follicle stimulating hormone) is secreted
- by the pituitary gland✓hypophysis
- FSH stimulates the development of primary follicles✓
- in the ovary✓
- into mature Graafian follicles✓
- Developing follicles secrete oestrogen✓
- which stimulates the development of endometrial tissue✓
- the pituitary gland✓/hypophysis
- secretes LH✓ (luteinising hormone)
- which stimulates the process of ovulation✓
- Under the influence of LH the raptured follicle is transformed into a corpus luteum✓
- The corpus luteum produces the hormone progesterone✓
- that also plays a role in the thickening✓
- and the maintaining of the endometrium✓

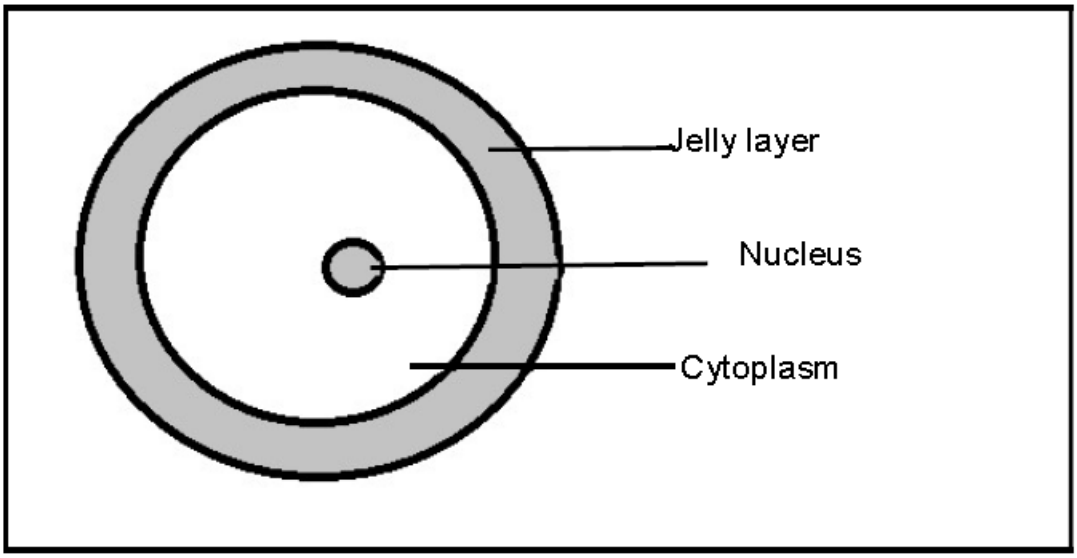
Progesterone and negative feedback in ovum control
- Increased levels of progesterone✓
- inhibit the pituitary gland✓/hypophysis
- from secreting FSH✓
- This prevents the development of any other follicles✓
- therefore no ovulation takes place✓

(17)

7.1 (a) Graafian follicle✓ (1)
(b) Ovulation✓ (1)
7.2 LH✓/Luteinising hormone (1)
7.3 - High level of progesterone will inhibit the secretion of FSH✓
- by the pituitary gland✓/hypophysis
- No follicles development will occur✓
- and therefore no ovulation✓ Any (3)

7.4 The corpus luteum✓ has degenerated✓ (2)
7.5 - No follicle will develop✓
- No oestrogen✓
- to thicken the endometrium✓
- which is shed✓ during menstruation (4)

7.6



Criteria for marking diagram

Criteria	Marks
Correct diagram (ovum)	1
Any 2 correct labels	2

(3)

8.1 B – urethra✓ (1)
D – Prostate gland✓ (1)
E – Testis✓ (1)

8.2 - Under the influence of testosterone✓
- diploid cells✓
- in the seminiferous tubules✓of the testis
- undergo meiosis✓
- to form haploid sperm✓ Any (4)

8.3 - The testes will be further away from the body✓
- The temperature of the testes will therefore be lower than body temperature✓
- for successful sperm production✓

OR

- Tight underwear will pull the testes closer to the body✓
- The temperature of the testes will be too high✓
- and sperm will not mature□/sperm production is negatively affected (3)

8.4 - The fluid part of the semen will still be produced✓
- by the accessory glands✓/seminal vesicles/prostate gland/ Cowper's glands (2)

8.5 - The acrosome✓
- contains enzymes to dissolve a path into the ovum✓

- Nucleus of the sperm✓
- carries genetic material of the male✓/haploid number of chromosomes

- Many mitochondria✓in the middle piece
- release energy✓so that sperms could swim

- The presence of a tail✓
- enables sperm cells to swim✓towards the ovum

- The contents of the sperm cell such as the cytoplasm is reduced✓/condensed
- making the sperm light for efficient movement✓

- Sperm is streamlined✓
- to allow for easier movement✓ Any 3 x 2 (6)

ANSWERS TO REVISION TEST:

Biological terms:

	Biological term	Description
1	Phylogenetic tree	A diagram representing possible evolutionary relationships between species
2	Continuous variation	A type of variation where there is a range of phenotypes for the same characteristic
3	Biogeography	The present-day distribution of living organisms
4	Homologous structures	Similar structures in different species that show modification by descent
5	*Australopithecus*	The genus of the fossil 'Little Foot'
6	*Homo habilis*	The first Homo species to use tools
7	Artificial selection	A breeding process used for the domestication of plants and animals
8	Foramen magnum	The opening in the skull through which the spinal cord enters
9	Chorion	The membrane that, together with the endometrium, forms the placenta
10	Acrosome	The structure in the head of a sperm containing digestive enzymes
12	Prolactin	The hormone that stimulates the production of milk in a mother after the birth of a baby
13	Gestation	The period of development of the foetus in the uterus
14	Fallopian tubes	Structure in the female reproductive system where fertilisation occurs
15	Puberty	The stage when secondary characteristics develop in males and females
16	Vivipary	A type of reproduction in humans where the foetus develops inside the uterus

16 x 1 (16)

Items and statements:

1. B only✓✓
2. A and B✓✓
3. B only✓✓
4. A and B✓✓
5. B only✓✓
6. A and B✓✓
7. B only✓✓
8. None ✓✓
9. A only✓✓
10. None✓✓
11. A only✓✓
12. B only✓✓

12 x 2 (24)