



**GAUTENG PROVINCE**

EDUCATION

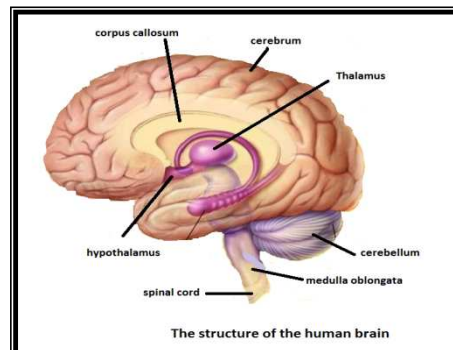
REPUBLIC OF SOUTH AFRICA

## ***LIFE SCIENCES***

### ***Grade 12***

### ***Paper II***

## **TEACHER RESOURCE**



## LIFE PROCESSES

### QUESTION 1

- 1.1.1 The absence of the auxins in B allowed the buds to develop into lateral branches/  
Removal of apical dominance  
and the presence of the auxins in C prevented the development of buds/  
the presence of auxins lead to apical dominance
- 1.1.2 At the tip of the shoot
- 1.1.3 (a) Main shoot will continue to grow upright/side branch will grow towards light  
(b) Auxins absent because tip is cut off  
No unequal elongated of cells/no bending towards light source
- 1.2.1 Auxins
- 1.2.2 (i) D  
(ii) Auxins are produced in the tip of the stem but because the plastic does not allow the movement of auxins downwards  
no cell elongation took place  
no growth
- 1.2.3 (i) C  
(ii) Auxins which are produced in the tip of the stem can move through filter paper  
and cause cell elongation on the shady side  
causing the stem to bend towards light  
and growth took place.
- 1.3.1  $10^{-1}$ /0.1 parts per million
- 1.3.2  $10^{-3}$ /0.001 parts per million
- 1.3.3 At the tip of the root and tip of shoot
- 1.3.4 Auxins in the tip of the main shoot move down to the side branches/lateral buds/axillary buds where the higher concentration of auxins will inhibit and slow down the growth of these side branches/lateral buds/axillary buds while the main shoot grows much more strongly.
- 1.4. (a) Many plants produce chemicals that play a major role in the protection against infection from pathogenic micro-organisms and from being eaten by herbivores. Some of these chemicals act as repellents, they may influence the herbivore's metabolism and some may even be poisonous and cause the death of the animal.
- (b) Some plants such as *Acacia spp.* have thorns that discourage herbivores from feeding on them. Thorns also reduce water loss.

**QUESTION 2**

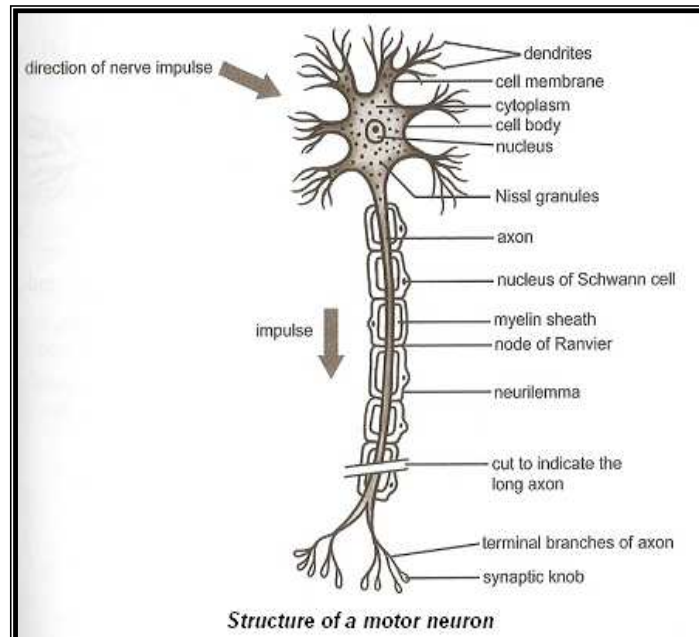
- 2.1.1 A Dendrite  
 B Axon  
 C Cell body  
 D Dendron/dendrite  
 E Interneuron/connector neuron/axon  
 F Receptor (sense organ)
- 2.1.2 (a) Sensory / monopolar/afferent/unipolar neuron Diagram 2  
 (b) Motor / multipolar/efferent neuron Diagram 1
- 2.1.3 (a) Conducts impulses from the connector neuron / spinal cord to the effector/muscle  
 (b) Conducts impulses from the receptor to the spinal cord/connector neuron
- 2.1.4 - Area where impulses pass  
 - from one neuron to the next

**OR**

- Communication site/area or space  
 - between two neurons
- 2.1.5 Reflex arc / neuron
- 2.1.6 Neurotransmitters generate electric signals that are conducted as nerve impulses to the cell body of the next neuron.
- 2.2.1 (i) D  
 (ii) C  
 (iii) A  
 (iv) B
- 2.2.2 Bony skull, cranium, membranes, meninges, cerebrospinal fluid

- 2.3.1 A – cerebrum  
B – cerebellum  
C – medulla oblongata  
D – spinal cord
- 2.3.2 Provides a pathway for the conduction of impulses to and from the brain  
It contains reflex centres
- 2.3.3 Reflex arc
- 2.3.4 The receptor converts the stimulus to an impulse which is transmitted to the sensory neuron  
and then to the inter-/connector neuron/spinal cord  
which transmits the impulse to the motor neuron  
The motor neuron carries impulses to the effector/muscle
- 2.3.5 To allow an individual to react or respond fast enough to a stimulus  
To prevent further damage to the tissues
- 2.4.1 A – Interneuron                      B – Sensory/afferent neuron
- 2.4.2 E- Knee/tendon/receptor
- 2.4.3 Impulses from reflex centres will not reach the effector (muscle) OR feel but not respond.
- 2.4.4 Blinking of eyes, yawning, sneezing, coughing, peristalsis, dilation and construction of pupil, heart.
- 2.4.5 Protective
- 2.4.6 A reflex action is a quick, automatic movement by an effector in response to a stimulus received by a receptor.
- A reflex arc is the pathway along which nerve impulses are carried from a receptor to an effector to bring about a reflex action.
- 2.5.1 A – cerebrum  
B – cerebellum  
C- Sensory neuron  
D – Medulla oblongata  
F – Pituitary gland/hypophysis
- 2.5.2 Lack of muscle control/lack of co-ordination
- 2.5.3 F
- 2.5.4 B

## 2.5.5



2.5.6 Hammer strikes the knee stimulating the touch receptors. An impulse is transmitted along the dorsal root where the sensory neuron makes a synapse with an interneuron. The impulse moves along the motor neuron to the effector/muscle in the leg. Leg is raised upwards. Impulse also moves to the brain to be interpreted.

2.6(a) The main chemical substance in dagga enters the bloodstream after intake and combines with specific receptors in the brain especially those receptors in the brain areas involved with memory, concentration, perception and movement. When these receptors are activated by the chemical substance, it impedes the normal functioning of these receptors in the brain areas. This may lead to drowsiness, decreased coordination and altered sense of time and space.

(b) In the brain heroin is converted into morphine (natural substance) which attaches itself to specific receptors causing an exaggerated sense of happiness. The drug has a depressive effect on the CNS, breathing slows down and pain is suppressed.

(c) Ecstasy causes an excessive release of a neurotransmitter which over-stimulates brain neurons. It causes damage to the terminal branches of the axons. It has a negative effect on the person's emotions, memory and ability to learn.

- (d) Tik stimulates the nervous system. Accelerated breathing and heart rate are some of the symptoms. Tik causes an excessive release of a certain neurotransmitter which over-stimulates neurons in the brain and eventually damages these neurons.

### 2.7.1 Sympathetic and parasympathetic systems

#### 2.7.2

	<b>Sympathetic system</b>	<b>Parasympathetic system</b>
a.	Increases heart rate	Decreases heart rate
b.	Constricts blood vessels in skin	Dilates blood vessels in skin
c.	Decrease peristalsis	Increases peristalsis
d.	Dilates pupils	Constricts pupils

2.8.1 Interneuron ✓ /connector neuron/association neuron

2.8.2 Motor neuron ✓

2.8.3 The person will become aware of the stimulus ✓ but the motor neuron will not be able ✓ to transmit the impulse from the interneuron ✓ to the effector organ ✓ /muscles and movement will not take place ✓ / reaction will not occur

2.8.4 Helps to protect the body ✓ by reacting quickly ✓  
The interneuron makes a short cut ✓ /not going to the brain/  
uses a reflex pathway that is immediately available

### QUESTION 3

3.1.1 (a) A }  
C } Mark first 3 only  
I/F }

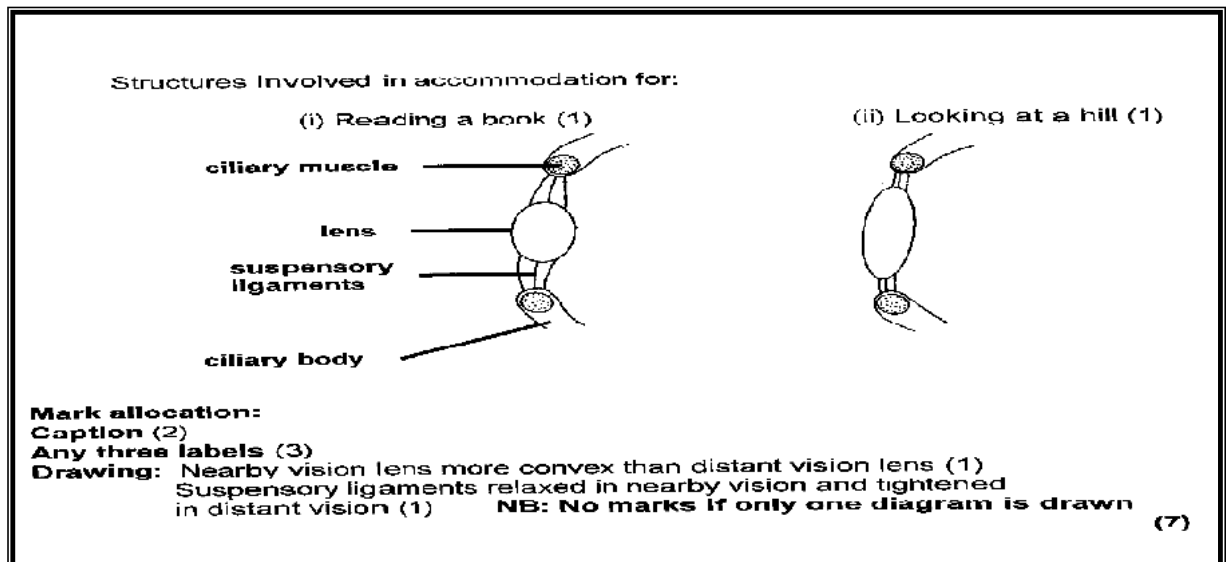
(b) B }  
D } Mark first 3 only  
G }

(c) D }  
F } Mark first 3 only  
K }

3.1.2 (a) Eye muscle  
(b) Retina

- 3.1.3 - Circular muscles  
 - contract  
 - Radial muscles  
 - relax  
 - pupil becomes smaller  
 - less light enters eye

3.2.1



3.3.1 Iris

- 3.3.2 (i) Between the second and third intervals  
 (ii) Between the sixth and seventh intervals

3.3.3 The electrical bulb was at the same distance from the eye.

3.3.4 At the five minute interval

At this interval the size of the pupil was the largest and it was opened wider to adapt to the dim light

3.3.5 At the 8 minute interval the eye is adjusted for bright light and at 9 minute interval the eye is exposed to dim light.

The radial muscles contract and the pupil dilates and more light enters the eye.

3.3.6 The closer any bright light source is to the eye  
 the smaller the diameter to the pupil and vice versa

3.3.7 Constricts in bright light/prevents light from entering the eye.

- 3.4.1 A Ciliary body/ciliary muscle  
 B Suspensory ligament

3.4.2 (i) Diagram II

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

- (ii) Diagram 1
- 3.4.3 Suspensory ligaments are slackened. /Lens looks smaller or more convex
- 3.4.4 (i) D  
(ii) F
- 3.4.5 Can change its shape to focus image on the yellow spot  
Irrespective of distance from eye/for near or distant vision/accommodation
- 3.5.1 (a) A  
(b) B
- 3.5.2 (a) Longer than usual  
(b) Shorter than usual  
(c) Clear focal point on retina  
(d) Focus point lies behind the retina  
(e) Concave lens  
(f) Convex lens  
(g) Cornea is made flatter (less convex)  
(h) Cornea is thickened to make it rounder (more convex)
- 3.6 (a) **Nature and treatment of astigmatism:**  
In astigmatism the cornea or lens has an irregular shape causing light rays to be focus on two points on the retina instead of one. Condition can be corrected by glasses, contact lenses or laser surgery
- (b) **Nature and treatment of cataracts:**  
This condition results in the clouding of the eye's normal, clear transparent lens by proteins. With age the proteins of the lens may clump together, clouding a small area of the lens. The cataract can become bigger over time. Glasses can help to improve vision but eye surgery is also an option. During eye surgery the lens is removed and replaced with a clear synthetic lens.
- 3.7.1 (i) position 7  
(ii) diameter of the pupil widest to receive more light  
light intensity is the lowest
- 3.7.2 Radial muscles of the iris contracted  
Circular muscles of the iris relaxed



- 3.8.1 (a) 7✓  
 (b) Diameter of the pupil is the largest✓, indicating dim light conditions✓/  
 allowing more light to enter

- 3.8.2 Since less light enters the eye  
 - the radial✓ muscles of the iris [contract]✓  
 - the circular✓ muscles of the iris [relax]✓  
 - causing the pupil to dilate✓/become wider/become bigger  
 thus allowing more light to enter

[ ] = **only allocate mark if linked to correct muscle**

- 3.9.1 2 – cornea✓  
 3 – lens ✓  
 4 – suspensory ligaments ✓  
 5 – ciliary muscles✓/body

- 3.9.2 Pupillary mechanism ✓/Pupil reflex

The radial muscles ✓ of the iris contracts ✓ and the circular  
 muscles ✓ relax✓

The pupil ✓ dilates and more light enters the eye✓ (Any 5)

- 3.9.3 (a) Wear spectacles with convex ✓ lenses/use contact convex  
 lenses/using lasers during surgery to reshape the cornea  
 (b) Wear spectacles with lenses which are unevenly ground✓ to  
 compensate for the uneven cornea/lens/surgery  
 (c) Cataracts surgically✓ removed/lens replacement  
 (d) Wear spectacles with concave ✓ lenses/use contact concave  
 lenses/using lasers during surgery to reshape the cornea

**QUESTION 4**

- 4.1.1 B tympanic membrane  
 C malleus/hammer  
 D semicircular canals  
 F cochlea

4.1.2 Has many ridges to direct the sound waves along the auditory canal  
 Extends outside the head/large flaps/funnel shaped to trap sound waves

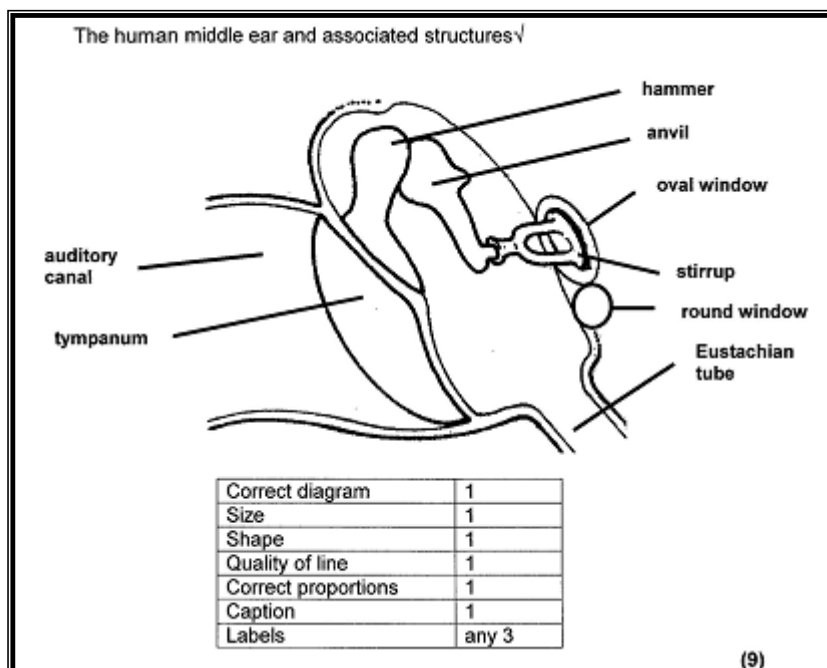
- 4.1.3 (i) D  
 (ii) A  
 (iii) G  
 (iv) E  
 (v) F

4.2 (a)

Normally occurs after a viral infection of the upper respiratory tract when the tissue at the back of the nose and throat is swollen. Eustachian tube cannot function properly and air pressure in middle ear drops. Fluid starts to build up in the middle ear causing the eardrum to bulge, causing pain.

- (b) Surgical - Small cut is made in tympanic membrane to drain fluid and a ventilation tube (grommet) is inserted. The grommet allows air to enter middle ear.

4.3



- 4.4 Balancing on one leg takes place through the sensitive hair cells found in the ampulla  
Cupulae at the base of the semi circular canals and otoliths found in maculae of the utricle and saccule  
And are responsible for dynamic equilibrium and register the position and movement of the head in any direction  
Impulses are generated and transmitted to the cerebellum which also receive impulses from proprioceptors in muscles and joints and reacts to the tension or tone of the muscles by transmitting the information to the cerebrum which brings about a co-ordinated reaction and enabling the person to maintain balance and body position
- 4.5.1 (i) -Traps dust  
- Prevents insects/small animals from entering ear  
- Keeps eardrum moist
- (ii) - Hearing will worsen (1) because  
- plug will hamper free movement / vibration of tympanic membrane  
- and weaker sound waves will be transferred to inner ear
- 4.5.2 (i) - Yes  
(ii) - air in cavity conducts sound waves
- 4.5.3 - Cerebellum  
- Nerve VIII links part with receptors for balance to the brain  
- cerebellum co-ordinates balance
- 4.6.1 A – Tympanic membrane✓/ Tympanum/Eardrum  
C – Oval window✓/fenestra ovalis  
D – Round window✓/fenestra rotunda
- 4.6.2 B – transmit vibrations✓ from the tympanic membrane to inner ear/ amplifies sound waves
- D – prevents pressure build up of waves✓/absorbs pressure wave set up by tympanic canal of the inner ear/eases sound waves out of inner ear/ prevents sound waves from moving backwards in perilymph
- 4.6.3 Tympanic membrane/A has a larger surface area✓ than the oval window✓/C
- 4.6.4 Ossicles will not vibrate freely ✓  
to transmit vibrations to the inner ear✓/ causing partial deafness
- OR**
- Cannot equalise pressure ✓ on either side of tympanic membrane leading to pain✓/ middle ear infection/ a burst eardrum / vibrations not being transmitted/ partial deafness

**QUESTION 5**

- 5.1.1 (a) Hormones  
(b) Target organs

5.2.1 Pituitary / hypophysis

5.2.2 At the base of the brain

5.2.3 Stimulates normal growth of the skeleton and muscles of the body

5.2.4 Thyroid

5.2.5 Thyroxin

5.2.6 Regulates metabolic rate/promotes absorption of glucose/conversion of glycogen into glucose/accelerates heartbeat/essential for normal functioning of the nervous system

5.2.7 Adrenal

5.2.8 At upper end of kidney

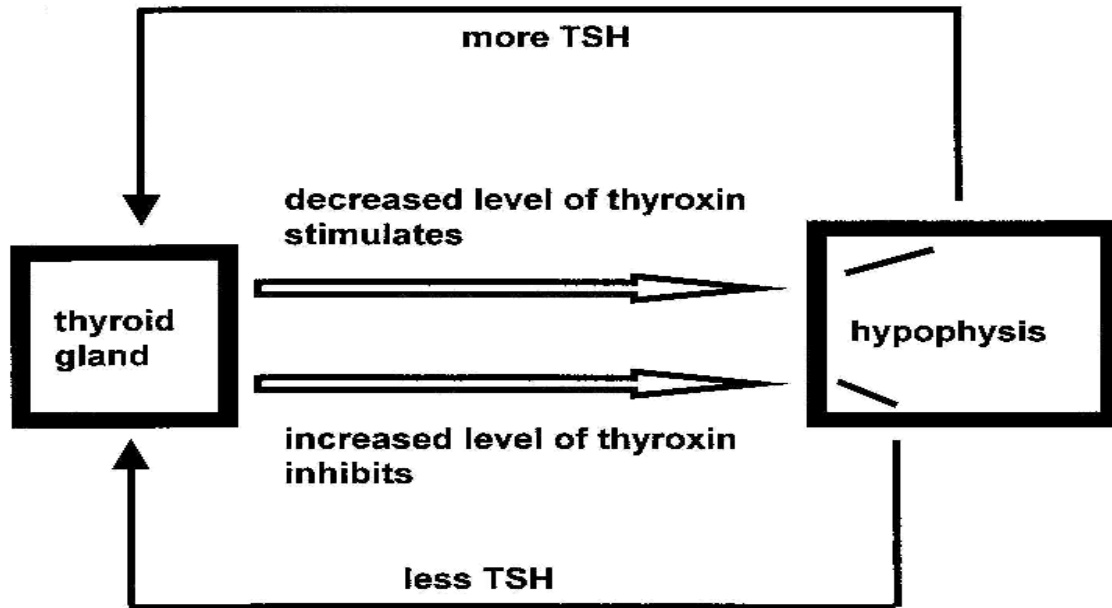
5.2.9 Adrenalin

5.3.1 1 – pituitary gland  
2 – thyroid gland

5.3.2 Thyroid stimulating hormone/TSH

5.3.3 High thyroxin concentration in the blood will stimulate the pituitary gland to secrete less TSH.  
The lower level of TSH will make the thyroid gland to secrete less thyroxin which will decrease the level of thyroxin in the blood

5.4



**Feedback mechanism controlling thyroxine production**

5.5.1 B: Thyroid gland  
C: Adrenal gland

5.5.2 - Secretions must enter blood vessels to be transported away (2)

5.5.3 A

5.5.4 - Due to a greater demand for energy in this emergency there is greater demand for thyroxine. Hypophysis is stimulated to secrete more TSH. Increased TSH stimulates the thyroid gland into secreting more thyroxine to increase the metabolic rate

5.5.5 (a) Decreases  
(b) Increases  
(c) Contracts

5.6.1 1 – pituitary ✓ gland  
4 – adrenal ✓ gland

5.6.2 (a) 3 ✓  
(b) 1 ✓  
(c) 2 ✓  
(d) 4 ✓

5.6.3 They respond to internal and/or external stimuli ✓  
They protect organisms ✓  
**(Mark first TWO only)**

5.6.4 Hormones: Responses are slow processes ✓ / may affect multiple sites  
Nerves: Responses are quick reactions ✓ / affect localised sites

5.7 **Possible answer**

**Hypothalamus**

- The change in temperature is detected ✓ by the thermo-receptors ✓ in the skin
- Stimulus converted to nerve impulse ✓
- Transmitted to the hypothalamus ✓
- Hypothalamus sends impulses to the muscle layer in the arterioles ✓ of the skin  
(Max 3) (3)

- **On a cold day** the arterioles close to the surface constrict ✓ / vaso-constriction occurs
- Less blood ✓ flows to capillaries close to the surface
- Sweat production decreases ✓ / less sweat is lost
- less heat is radiated from the body ✓ / less heat is lost (4)

- **On a hot day** the arterioles close to the surface dilate ✓ / vaso-dilation occurs
- More blood ✓ flows to the capillaries close to the surface
- Sweat production increases ✓ / more sweat is lost
- More heat is radiated ✓ from the body / more heat is lost (4)

**Adrenal gland**

- Secretes adrenalin ✓
- Hormone that prepares the body to cope with emergency ✓ / danger / stress situations
- Adrenalin causes the blood vessels of the skin to constrict ✓
- Less blood flows to the surface of the skin ✓
- Because the skin is not an important organ during an emergency ✓
- Re-directing more blood / more oxygen and food to vital organs ✓
- To enable the body to respond during an emergency ✓ (Max 6) (6)

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

**ASSESSING THE PRESENTATION OF THE ESSAY**

Marks	Descriptions
3	Well structured – demonstrates insight and understanding of question
2	Minor gaps in the logic and flow of the answer
1	Attempted but with significant gaps in the logic and flow of the answer
0	Not attempted/nothing written other than question number

**Synthesis (3)**

**QUESTION 6**

- 6.1.1 A Epidermis  
C Erector/hair muscle

6.1.2 Dilation/will become bigger/increased blood flow

6.1.3 More blood flows to surface and more heat reaches the surface  
increasing heat gradient between surface and environment  
so that more heat is lost to the environment  
to cool down the body

- 6.1.4 (i) Adrenalin / (noradrenaline /epinephrine/ norepinephrine )  
(ii) Emergency / fight / flight /anger/ fear /danger/ excitement /shock  
(iii) - Blood vessels constrict  
- Less blood directed to skin  
- and blood pressure increases  
- so that more blood can be directed to  
- brain / lungs / heart / muscles (or any other relevant part)  
- to provide more fuel / glucose  
- and oxygen  
- to increase respiration rate  
- to provide more energy to deal with the emergency
- (iv) Stimulate it / to produce more thyroxin
- (v) - increase metabolism / respiration rate .  
- to provide more energy in the emergency .

6.2.1 Hypothalamus

6.2.2 37,5 °C

6.2.3 10 minutes

6.2.4 Most human activities is controlled by enzymes and enzymes require optimum temperatures to function

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6.2.5 Diagram I

6.2.6 Blood vessels dilated to bring more blood to the surface and more heat will be lost.

**OR**

Increased sweat production which will cool down the body

6.3.1 - Erector/hair muscle  
- Controls position of hair

6.3.2 (a) Diagram 1

(b) Diagram 2

6.3.3 - Blood vessels in skin constrict to conserve heat in cold weather  
- hence less blood reaches skin

6.3.4 - Diagram 2  
- Panting takes place in hot weather  
- and hairs lie flat in hot weather  
- to facilitate loss of body heat

6.3.5 - Body heat used  
- to bring about evaporation of liquid from tongue  
- also warm liquid leaves body  
- thus cooling down body

6.4.1 (c)/Has a larger surface area to volume ratio than the elephant

6.4.2 - They have a higher metabolic rate  
- to release more heat energy per unit mass than larger animals

6.5.1 37.6 °C

6.5.2 40 minutes

6.5.3 Heat is given off from the skin to cold water.



6.5.4 Shivering causes an increase in muscle activity which produce heat to increase body temperature back to normal

- 6.5.5 (i) Ear  
 (ii) Ear has a large surface area with superficial blood capillaries through which heat is lost to the surroundings through radiation

## 6.6

- When abnormal levels of glucose are detected✓
- by the pancreas✓,
- the Islets of Langerhans✓ secretes hormones
- into the bloodstream✓

### When blood glucose level rises✓

- Insulin✓ is secreted
- to decrease the blood glucose level✓
- back to normal✓
- insulin secretion is then inhibited✓

### When blood glucose level falls✓

- Glucagon✓ is secreted
- to increase the blood glucose level✓
- back to normal✓
- glucagon secretion is then inhibited✓

Any

(10)

### Causes of diabetes mellitus

- Inadequate secretion✓
- Non-secretion of insulin✓
- Production of defective insulin✓
- Body cells resistant to the action of insulin✓
- Inability of the cells to use glucose efficiently✓

Any

(2)

### Symptoms

- Glucose in the urine✓
- Frequent urination✓
- Extreme thirst✓
- Fatigue✓/lethargy/faintness
- Nausea✓/ Vomiting
- Weight loss✓
- Blurred vision✓
- Non-healing of wounds✓

Any

(3)

### Management of diabetes mellitus

- Exercise✓
- Eating diet suitable for diabetic person✓
- Using prescribed medication/drugs ✓ for the management of diabetes mellitus

Any

(2)

**Content** (17)

**ASSESSING THE PRESENTATION OF THE ESSAY**

Marks	Descriptions
3	Well structured – demonstrates insight and understanding of question
2	Minor gaps or irrelevant information in the logic and flow of the answer
1	Significant gaps or irrelevant information in the logic and flow of the answer
0	Not attempted/nothing written other than question number/no relevant information

**Synthesis (3)****QUESTION 7**

7.1.1 Involves only one parent and all offspring have the same genetic composition as the parent. No fertilization takes place.

7.1.2 Two parents are involved and their genetic material mixes. Fertilisation takes place.

7.1.3 A life cycle in which a haploid gametophyte phase alternates with a diploid sporophyte phase.

7.1.4 The full set of genetic material in a cell, consisting of two sets of chromosomes.

7.1.5 Half of the full set of genetic material in a cell, consisting of a single set of unpaired chromosomes.

**7.2.1 AND 7.2.2**

Type of reproduction	Advantages	Disadvantages
Asexual reproduction	<p>In plants pollination is not necessary and can happen at any time and not in a particular season.</p> <p>Gametes are not necessary so reproduction happens faster.</p> <p>Fertilisation is not necessary and so happens faster and needs less energy.</p> <p>Produces large number of offspring.</p> <p>All individual organisms reproduce on their own and do not depend on finding mating partners.</p>	<p>Offspring are genetically identical to the parent and all members will have the same weaknesses and whole population can be easily destroyed e.g. by diseases.</p>

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Sexual reproduction	<p>Variation in their genes makes individuals less prone to the same diseases and makes sure that the gene pool is mixed.</p> <p>Variation in the offspring allows some individuals to have a greater chance of survival in changing environments.</p>	<p>Produces a smaller number of offspring.</p> <p>Needs more energy than asexual reproduction.</p> <p>Takes longer to happen than asexual reproduction.</p> <p>Low population density decreases the chances of finding mating partners.</p>

7.3.1 Moss

7.3.2

(a) Mitosis

(b) Fertilisation

(c) Meiosis

7.3.3 Haploid

7.4.4 No

7.4.1 The process during which certain animals e.g. insects change their physical form during different stages of development in their life cycles.

7.4.2 A life cycle in which the organism that hatches out of the egg looks very different from the adult who laid the egg.

7.4.3 A life cycle in which the organism that hatches out of the egg is a small version of the adult.

7.5.1 Incomplete metamorphosis

7.5.2 A – nymph

B – adult

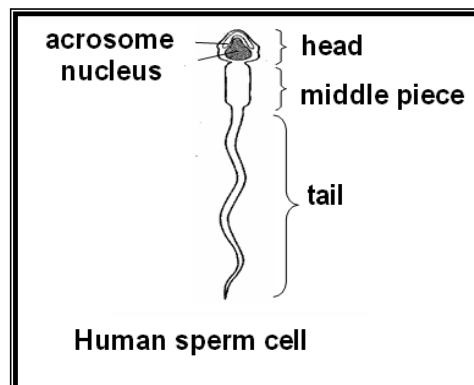
C – egg

7.5.3 The nymph is smaller than the adult and without wings.

- 7.5.4 The nymph and adult usually share the same habitat and compete for the same food source. OR  
The nymph has an inflexible exoskeleton and has to moult to grow. Immediately after moulting the exoskeleton is soft and light in colour, making the insect vulnerable for predation and dehydration.
- 7.5.5 The vulnerable larval and pupal stages are absent.
- 7.6.1 Pollination is the transfer of pollen from the anther to the stigma of the flower.
- 7.6.2 Flower A
- 7.6.3 Large anthers , No petals , Large feathery stigma
- 7.6.4(a) Seeds are adapted to be dispersed by wind, insects etc. and the new seedlings germinate far from the mother plant , limiting competition.  
Seeds store reserve food in the endosperm and the reserve food make it possible for seeds to survive harsh weather conditions by remaining dormant.  
The hard, resistant testa that surrounds the seed protects the embryo against unfavourable conditions.  
The cotyledons of the embryo provide food for the young, developing seedlings after germination.
- (b) Re-establishment of endangered or extinct plants.  
Rehabilitation of damaged and destroyed habitats.  
Cultivation of plants that is overexploited.  
Cultivation of new hybrids that are more tough and resistant to disease.
- 7.7 Courtship, External vs internal fertilization, Ovipary/Ovovivipary and vivipary, Amniotic egg, Precocial and altricial development, Parental care.
- 7.8 (a) The egg is fertilized internally and laid outside the body to complete its development.
- (b) The egg is fertilized internally and kept inside the female's body to complete its development.
- (c) The egg is fertilized internally and develops into an embryo inside the female and the young are born live.
- (d) Refers to species where the young that are born or hatched are fully developed and are immediately mobile.
- (e) Refers to species where the young are not fully developed and cannot move around immediately after being born or hatched and need to be looked after.

**QUESTION 8**

- 8.1.1 A - prostate gland  
B - vas deferens / sperm duct  
E - urethra  
G - nucleus
- 8.1.2 C - Stores sperms temporarily/sperms mature here  
F - Contain enzymes to break down the cell membrane of the egg cell
- 8.1.3 D - testis /seminiferous tubules
- 8.1.4 To keep the testes at a temperature that is (about 3 °C) lower than body temperature  
A lower temperature is necessary for the production of healthy sperm /so that healthy sperms can survive
- 8.1.5 (a) Interstitial cells/Cells of Leydig  
(b) Testosterone
- 8.1.6 Severing of the vas deferens  
Will not allow sperms to pass to urethra and into the female and hence no fertilisation results.
- 8.2.1 Testosterone
- 8.2.2 Stimulates the development of primary male sex organs/  
Penis and testes  
Stimulates the development of secondary male characteristics /  
growth of body hair/muscle development/ deep voice
- 8.2.3 spermatozoa/ sperm cell
- 8.2.4



- 8.3.1 (a) Graafian follicle  
(b) Corpus luteum  
(c) Ovulation  
(d) FSH  
(e) LH
- 8.3.2 Meiosis
- 8.3.3 No
- 8.3.4 If fertilisation occurred the corpus luteum would stay intact and not be destroyed.
- 8.3.5 If fertilisation occurs high levels of progesterone enters the blood. The high levels of progesterone inhibits the production of FSH  
Low levels of FSH stop the development of a ovum inside a Graafian follicle  
No ovulation occurs when the individual is pregnant
- 8.4.1 A - Umbilical cord  
B - Placenta
- 8.4.2 - Has folds/villi to enlarge the surface area  
- Enriched with blood vessels for transport of gases/nutrients/waste products  
- Selective permeable membranes to promote diffusion of gases/substances  
- Contains blood sinuses to bring blood of mother in close association with that of foetus
- 8.4.3 - acts as a shock absorber/prevents mechanical damage  
- prevent great variation in temperature  
- allows for movement of the foetus  
- passes out before birth to lubricate the birth canal
- 8.5.1 Accept day 14 or day 15
- 8.5.2 Days 0 – 7
- 8.5.3 - Causes the follicle to burst open/stimulates ovulation  
- Stimulates the formation of the corpus luteum

- 8.5.4 - LH levels remain low up to day 12/13  
 - Then it increases sharply up to day 14  
 - After which it decreases and remains low
- 8.5.5 As the oestrogen level increases  
 the thickness of the endometrium also increases
- 8.5.6 Maintain the increase in the thickness of the endometrium  
 for greater chance of implantation
- 8.5.7 No
- 8.5.8 The progesterone level has dropped/not maintained/corpus luteum has started to degenerate
- 8.6.1 2003 and 2004
- 8.6.2 100 %
- 8.6.3 Table showing the number of pregnancies recorded in a province in South Africa

Year	Number of pregnancies
2001	200
2002	250
2003	350
2004	700
2005	750
2006	800

Header  
 Labelled columns correctly  
 Labelled rows correctly  
 Data in table: 4 to 6 correct  
 1 to 3 correct  
 Draw table

8.6.4	8.6.5
Man's responsibility	Women have to bear the long period of pregnancy and then childbirth so the man must show some responsibility in preventing this.
OR	
Woman's responsibility	Women have more types of contraceptives available to them OR Women have to bear the long period of pregnancy and then childbirth
OR	
Responsibility of both	Formation of the baby involves the participation of the man and woman

8.7.1 Gossypol acts as a contraceptive in males

**OR**

Gossypol does not act as a contraceptive in males

**OR**

(Gossypol has no effect on male fertility)

**OR**

(Gossypol has an effect on male fertility)

**OR**

(Gossypol increases male fertility)

**OR**

(Gossypol decreases male fertility)

8.7.2 - Determine the sample size

- Find volunteers

- and a comparable group as a control

- Design a way of recording the data

8.7.3 (a) Number of sperm

(b) Amount of Gossypol

8.7.4

(a) - Men can also take the responsibility for contraception

- Men don't have to use a condom during intercourse

- Control/lower population growth

(b) - Could have side effects/effects not yet known

- Against some people's religion to use contraceptive

- Some men don't want to take responsibility for contraception/women are responsible for contraception

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

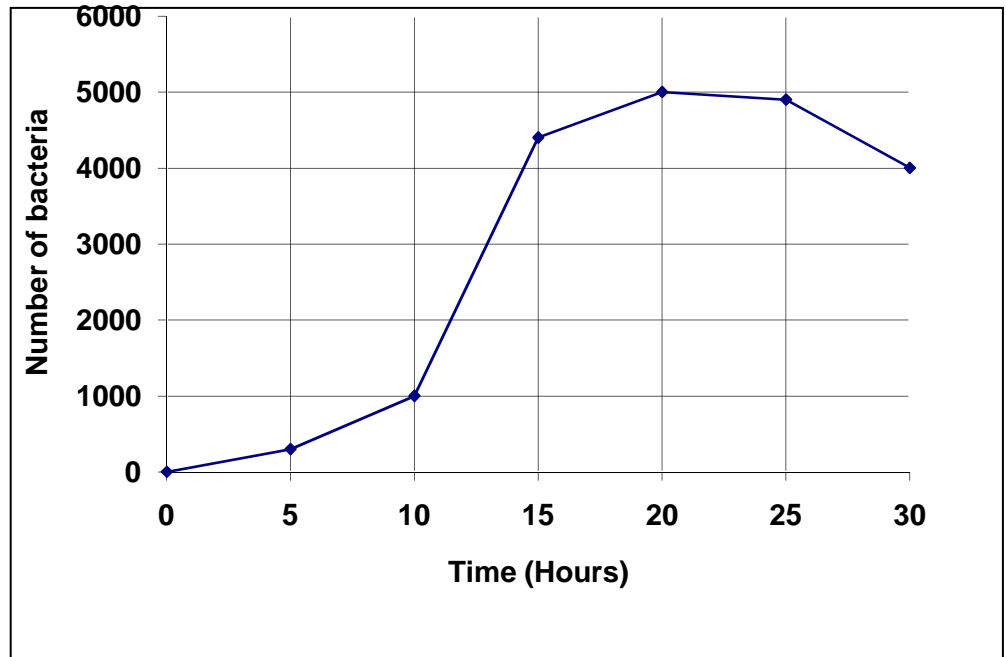


**ENVIRONMENTAL STUDIES**  
**POPULATION AND COMMUNITY ECOLOGY**  
**MEMORANDUM**

- 1.1.1 (a) Intraspecific competition – competition between individuals of the same species(1) for the same limited sources  
 Interspecific competition – competition between individuals of different species(1)for the same limited sources
- (b) Prey – the organism that is hunted, killed and eaten(1) by the predator  
 Predator – the organism that hunts, kills and eat (1)its prey
- 1.1.2 (a) lions(1) and cheetahs(1)
- (b) impala(1) / lions / cheetahs )(1)
- 1.1.3 Nearly all the grass/shrubs/young trees had been eaten(2)/ not enough food/predation
- 1.1.4 (a) The maximum number (1) of individuals that can be supported by an environment(1)
- (b) A group of individuals of the same species(1) inhabiting a particular area(1) at a specific time(1)
- 1.2.1 280 - 300 (1)rabbits
- 1.2.2 180 - 200 (2)
- 1.2.3 Lag (1)/ establishment phase
- 1.2.4(a) W - Few reproducing individuals (2)/few individuals are sexually mature  
 Individuals acclimatizing/adjusting to new environment /  
 Breeding partners do not meet  
 More births take place than deaths (Any 1 x 2)
- (b) X Favorable conditions (2)/  
 Absence of predators/  
 Increased natality/  
 Birth rate is higher than death rate (Any 1 x 2)

- (c) Y - Density independent factors(2)  
 - Temperature extremes  
 - Drought  
 - Fire  
 - Floods  
 - Diseases  
 - Degradation of the environment/ deforestation/ human settlement/ environmental resistance (Any 1 x 2)
- 1.3.1 8% (2)
- 1.3.2 10 – 14 jaar (2)
- 1.3.3 2,5 – 3 % (1)
- 1.3.4 - females(1)
- 1.3.5 - pyramid B (2)
- 1.3.6 fewer offspring produced(1) / lower birth rate- more individuals reaching old age / life span improves (1) - fewer deaths in the young / medical intervention / social services/ higher income(1) better quality food (1)  
 Any 2 (2)
- 1.4.1 (i) Predator= beetles (1)  
 (ii) Prey = plant lice (1)
- 1.4.2 Every time there is an increase in beetles (1), the number of plant lice decreased (1) / prey's numbers more than predators  
 OR  
 Ladybird beetles used to control the plant lice (2)
- 1.4.3 90 - 93 (2)
- 1.4.4 They were the prey of the growing number of beetle population/  
 predation (1)  
 Emigration (1)  
 Density independent factors (1) or examples
- 1.4.5 Ladybird population dropped / less predators (1)  
 Emigration of ladybird beetle (1)  
 Immigration of plant lice (1)  
 Any favourable condition (1)  
 Increased natality/birth rate (1)  
 Any 1

1.5.1



**axes(2), title of axes(2), + any 5 for plotting + 1 for joining points** (10)  
 If the scale on the Y-axis is not correct, candidates will only lose the 5 marks for plotting

1.5.2 logistic/ Sigmoid /S-shaped(1)

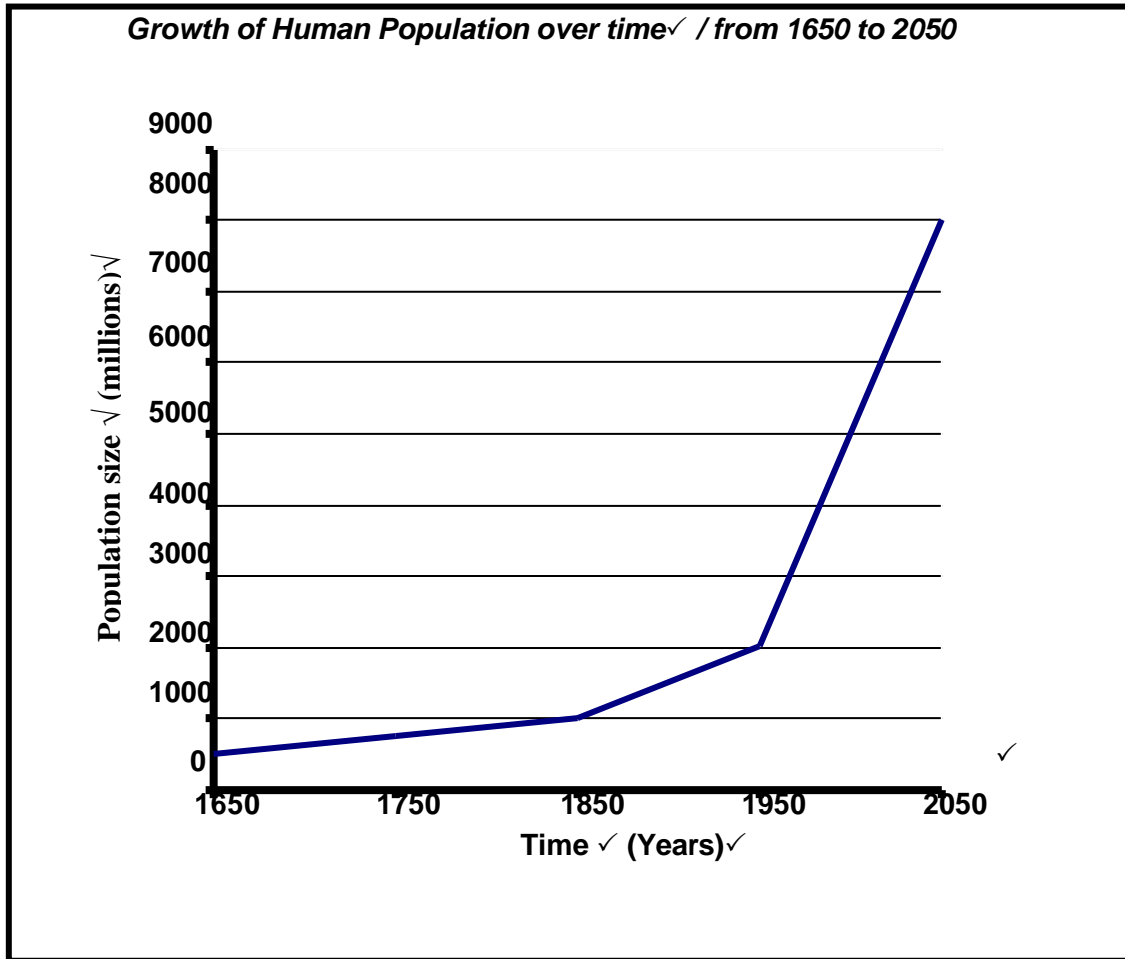
1.5.3 4900 – 5000 (2)

1.5.4 2,4 – 2,6 hours(2)

1.5.5 - the number of bacteria increased(1) rapidly(1)/natality increases (1)  
 - because of favourable(1) growth conditions eg. sufficient food  
 - and little or no limiting factors(1) any 3

1.5.6 - competition for food / space/ water(1)  
 - depletion of food / oxygen / space / water(1)  
 - habitat may become degraded /environmental resistance/ unfavourable conditions/carrying capacity exceeded (1)  
 - mortality increases(1) any 2

1.6.1



**Marking Rubric for the Graph**

▪ Choice and title of Axes	Independent Variable X; Dependent Variable Y	1 1
▪ Units for Axes	X-Axis Y-Axis	1 1
▪ Scale	Approximate. Not necessarily the mere repetition of data provided for : X Axis Y Axis	1 1
▪ Plotting of points	Correctly – All 5 points - 3 3- 4 - 2 1 -2 - 1 None plotted - 0	3
▪ Joining of points		1
▪ Title		1

**NOTE:** If bar graph drawn learners will lose marks for choice and title of axes and for joining of points. Credit all other aspects if correct.

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

- 1.6.2 exponential (1)/geometric/ J – curve
- 1.6.3 - decrease in mortality rate (1)  
 - increase in natality (1) of a population  
 - improved health services (1)  
 - improved quality of nutrition (1)  
 - little or no environmental resistance(1)
- 1.6.4(i) 5 000 million (2) (range: 3 500 – 5 500) / 5 billion (2)  
**For values outside range look at candidates graph**
- (ii) 200 (1) years (1)
- 1.6.5 (i) estimation (1)/projecting / by extending / continuing the present/past pattern of growth / by extrapolating
- (ii) - planning (1)  
 - managing (1)/developing/utilizing resources/food production  
 - preserving and conserving natural resources (1)  
 - design of rescue delivery programmes (1), such as  
 - distribution of the resources (1) and awareness campaigns
- (iii) - HIV/AIDS epidemic (1)  
 - lack of food (starvation) (1)  
 - global warming (1)  
 - pollution (1)  
 - war(1)  
 - poverty(1)  
 - natural disasters(1)
- (iv) - birth control (family planning)(1) strategies /lower fecundity  
 - improved food production (1)  
 - job creation (1)  
 - increased provision of energy (1)/water  
 - improved medical technology(1)  
 - improved education(1)/sex education  
 - sustainable/wise utilization of resources(1)
- 1.7.1 10 thousand /10 000
- 1.7.2 Lag phase /establishment phase
- 1.7.3 - slow growth  
 - predators still adapting to new environment / acclimatization /  
 - finding partners is difficult  
 - organisms have not reached reproductive age
- 1.7.4 -Yes / it was successful

- 1.7.5 - The insect pest ☐ has been completely wiped out
- 1.7.6 - protect environment (ecosystem) ✓ / soil from pollution ✓  
 - prevent transfer of chemical along the food chain ✓ which could become harmful to other species on the farm ✓  
 - prevent destruction ✓ of non-pest insects ✓
- 1.7.7 - By eating the insects, predators reduce the number of their prey ✓  
 - As the number of the insect (prey) population drops ✓  
 - more competition ✓ among the predators prevails  
 - thus resulting in a decrease ✓ in the number of predators  
 - and an increase ✓ in the number of prey  
 - and a corresponding increase ✓ in the predator population  
 - Finally the insect/prey population was wiped out ✓  
 - causing death of individuals within the predator population ✓  
 - Resulting in the predator population also dropping ✓ Any 4
- 1.8.1 Interspecific (1) competition between individuals of different (1) species
- 1.8.2 Humidity (1) density-independent (1)
- 1.8.3 Species B (1)
- 1.8.4 (i) S-shaped / logistic / sigmoid (1)
- (ii) - individuals must acclimatise / adapt to environment (1)  
 - locate mating partners (1)
- (iii) Lag phase/establishment phase (1)
- (iv) - Carrying capacity/equilibrium☐ is reached ☐☐OR
- The environment can support and accommodate☐ only a certain maximum number of individuals ☐OR
- Environmental resistance☐ increases☐
- 1.8.5 Both types ☐ of beetles will die out  
 both types of beetle live optimally at different  
 10% is too low/not optimum for either type of  
 OR  
 Species A might increase while species B might decrease  
 Species A prefers a lower humidity level while species B prefers a higher humidity level
- 1.9.1 A group of individuals of the same species (1) that live together in a particular space (1) and at a particular time(1) which can interbreed (1) freely

$$1.9.2 \quad P = \frac{20 \times 30v}{10v}$$

$$= 600v$$

- 1.9.3
- Too long time between first and second sampling
  - Emigration of species B and immigration of species A
  - Marking/capturing could have had a negative effect on species B
  - Poor/inadequate sampling/method
  - Species A probably had a more effective form of camouflage(1) against predators OR

Species B may be more prone to predators (1) than species A(1) OR

Species B has a lower (1) carrying capacity (1) OR

Species A has a higher (1) carrying capacity(1) OR

Species A has greater **natality**(1) and **lower mortality**(1) OR

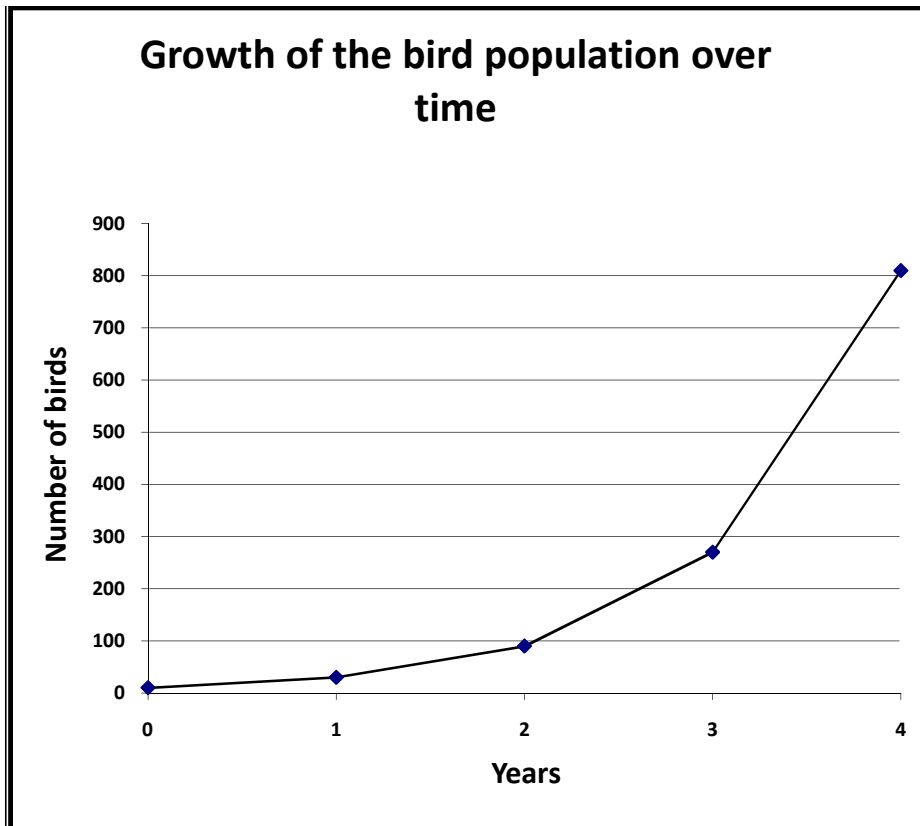
Species B has a **lower natality**(1) and **greater mortality**(1)

- 1.10.1
- (i) Earthworms/grass/plants competing with one another
  - (ii) A bird eating an earthworm

1.10.2 A group of organisms of the same species (1) that occupy a defined area(1) at the same time(1) where interbreeding is possible(1)

- 1.11.1 They must be...
- of the same species(1)
  - occupying a particular space(1)
  - living at a particular time(1)
  - able to interbreed (1)

## 1.11.2

**Rubric for the mark allocation of the graphs**

Correct type of graph	1			
Title of graph	1			
Correct choice for x and y axes	1			
Indication of the word Years on the x axis	1			
Correct label for y axis	1			
Appropriate scale for x axis	1			
Appropriate scale for y axis	1			
Plotting of points for graph	3: plotted all 5 points correctly	2: plotted 3 or more points correctly	1: plotted 2 or less points correctly	0: no points plotted
All plotted points joined	1			

Wrong type of graph drawn: marks will be lost for "correct type of graph" as well as for "plotting of points"

Wrong X and Y axes: marks will be lost for correct choice of axes and correct labels for X and Y axes

(11)

## 1.11.3 The population size will drop(1)

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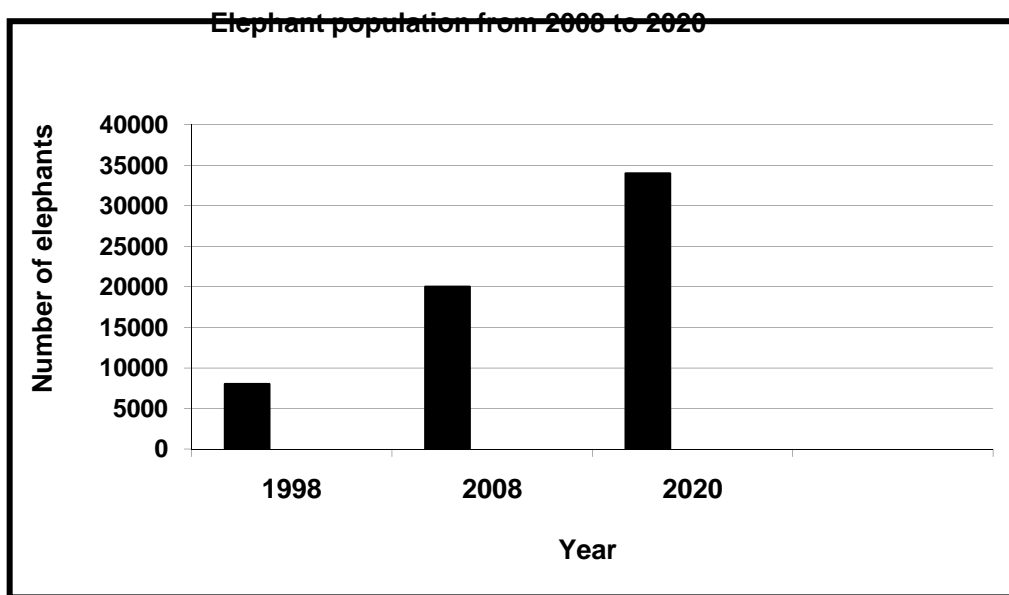
Because of increased competition for food(2)/shelter/mating partners/  
Emigration

- 1.11.4 (a) closed population(1)
- (b) carrying capacity(1)

1.12.1 Damage to the environment

- 1.12.2 Contraception
- Relocation of elephant families
- Removing fences to allow migration

1.12.3



1.13.1 The ecological footprint measures the quantity of biologically productive land and water required to regenerate the resources consumed by the human population, and to absorb and render harmless the waste generated by humans.

1.13.2 Angola, Kenya, Namibia and South Africa.

1.13.3 All of the countries are developing countries.

1.13.4 Germany

1.13.5 Namibia

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**ADDITIONAL QUESTIONS**

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

**LIFE PROCESSES**

1.1.1 Moist✓ and dark✓ conditions

1.1.2

- The other two dishes should have had dry paper✓ put in so that all the four dishes had the same paper✓/ to avoid introducing a new variable
- Test one variable at a time/light and moisture conditions separately✓ to determine which environmental factor ✓ was preferred by the woodlice
- Repeat the investigation✓ to increase reliability✓
- Ensure sufficient time✓ for the movement ✓ of the woodlice
- Use the same species✓/sex/age of woodlice as they might behave differently✓/this avoids the introduction of a new variable

**(Mark first ONE only)**

(Any 1 x 2)

1.2.1 The cell elongation✓ in the coleoptile

will increase✓/decrease/remain the same/differ

as the auxin concentration increases/decreases/differs✓

1.2.2 Removing the effect of auxin ✓ produced at the tip as there can be varying concentrations✓ produced by each plant

1.2.3 Type of soil✓/ amount of water/ light intensity/ temperature/ size of the pot/ keep environmental conditions the same

1.2.4 Increasing the concentration of auxin results in an increase in the cell elongation✓ up to an optimum concentration✓ then it starts inhibiting/decreasing the cell elongation✓

**ADDITIONAL QUESTIONS**

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

**ENVIRONMENTAL STUDIES**

## 1.1.1

- Obtain permission to catch fish/use dam ✓
- Conduct training to identify the *Tilapia sparrmanii* ✓
- Decide when to do the investigation ✓
- Decide on the tags ✓ /markers/apparatus to be used
- Decide on the method of catching ✓
- Determine the sample size ✓ /number of repeat samples
- Determine the period between the two successive captures ✓
- Decide on how to record the results ✓

**(Mark first FOUR only)**

$$1.1.2 \quad \text{Number of } \textit{Tilapia sparrmanii} (P) = \frac{(15 \times 150)}{10} \checkmark$$

$$= 225 \checkmark$$

## 1.2.1

**Two advantages**

- Creating new jobs ✓
- Job reservation/job losses prevented ✓
- Contribute to the economy of the town ✓ /income to municipality from tax rates will increase through businesses
- Minerals available more cheaply ✓
- Develops infrastructure of the town ✓

## 1.2.2

**Two disadvantages**

- Health implications ✓
- Decrease of the property values of the residents ✓
- Income to municipality from tax rates will decrease ✓ through decline in property value
- Exploitation of the community ✓
- Loss in biodiversity ✓
- Increase in pollution ✓
- Environmental degradation ✓
- Conflict in the community ✓

**(Mark first TWO only)**

## 1.3.1

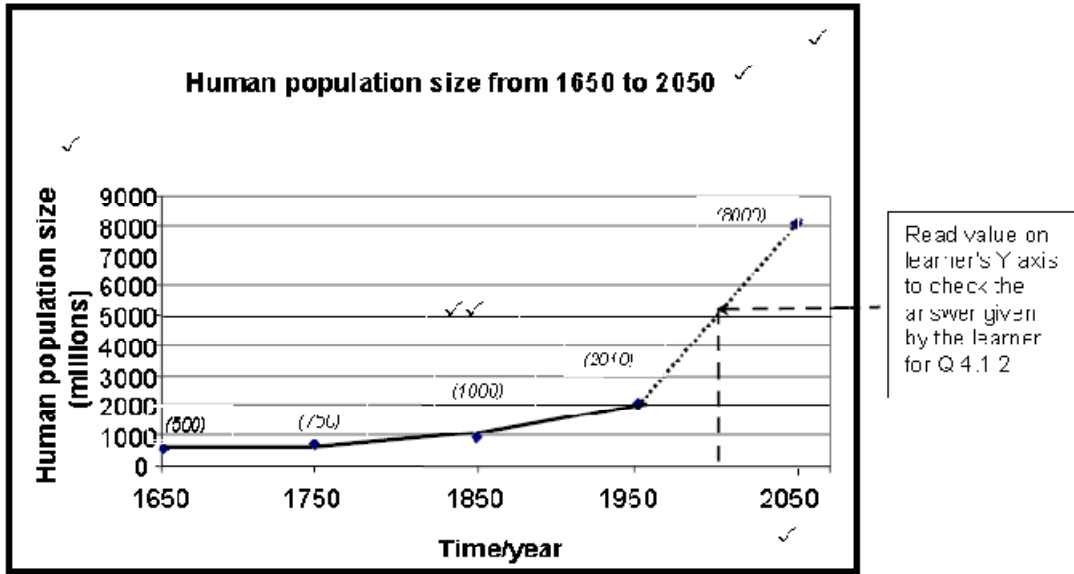
- (a) Resource /Spatial/niche partitioning ✓

- (b) Intraspecific ✓ competition
- (c) Competitive exclusion ✓ principle/interspecific competition

1.3.2

- Different species ✓
- coexist in the same habitat ✓
- eating leaves of plant at different heights ✓ / use the resources slightly differently
- minimising competition ✓

1.4.1



**Guideline for the assessing the graph**

Correct type of graph and joining of points	1
Title of graph	1
Correct label and scale x-axes	1
Correct label and scale y-axes	1
Plotting of points of line graph	1: 3 to 4 points plotted correctly 2: All 5 points plotted correctly

**NOTE: If the wrong type of graph is drawn: marks will be lost for**

- correct type of graph - 1 mark
- plotting of points – 2 marks

**If labels of the axes are transposed then marks will be lost be for:**

- correct label and scale for X and Y axes – 2 marks

1.4.2

*Adapted and compiled by J Gerber and J Goliath (Western Cape)*

(a) Read from the learners graph

(value ✓ and for million ✓ /000 000)

(b) 200 ✓ years ✓

1.4.3

- To budget ✓ for infrastructure development e.g. housing
- To plan ✓ for services in the future e.g. education
- To have strategies ✓ / any example to improve the sustainability of the environment

**(Mark first TWO only)**

1.5.1

Logistic ✓ growth form/S-shaped/sigmoid

1.5.2

A = Lag ✓ /Establishment phase

B = Exponential ✓ /Geometric/accelerating/log/logarithmic phase

C = Equilibrium ✓ /Stationary/Stabilising/Constant phase

1.5.3

B ✓

1.5.4

- Environmental resistance increased ✓
- causing the carrying capacity of the area to be reached ✓
- leading to increased competition ✓
- resulting in the death rate increasing to equal the birth rate ✓
- or resulting in increased emigration that balances with immigration ✓

Any

1.5.5

- Population is acclimatising/adapting to its new environment ✓
- Few pairing partners ✓
- Time required for producing offspring is relatively long ✓
- Not all individuals are sexually mature ✓

**(Mark first TWO only)**

1.6.1

Country C ✓

1.6.2

Country B✓

1.6.3

Shows an increasing birth rate✓ compared to the other two countries

Death rate is still higher✓ than the other two countries

**(Mark first ONE only)**

(Any 1)

1.6.4

- Improvement in water supply✓/sewage treatment/hygienic food handling /and general standards of cleanliness – have eradicated many disease✓ such as typhoid fever, amoebic dysentery resulting in decreased death rate
- Mass immunisations✓ against polio, measles, small pox, mumps decreased the incidence of disease✓
- Discovery of antibiotics ✓ has now made it possible to treat most diseases caused by bacteria ✓e.g. TB that used to kill many people in the past
- Agriculture has become more efficient✓/production of more food preventing starvation ✓/death in many countries
- Improved medical care✓ therefore fewer deaths due to illness✓
- Focus on lifestyle change✓/exercising /healthy living therefore fewer deaths due to diabetes etc✓

**(Mark first TWO only)**

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