

Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2016

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

MARKS: 150

TIME: 2½ hours

N.B. This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You may use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 Meiosis ensures that each new cell produced by cell division will have ...

- A the same number of chromosomes as the original cell.
- B twice the number of chromosomes as the original cell.
- C half the number of chromosomes as the original cell.
- D homologous chromosomes.

1.1.2 Involuntary actions are controlled by the ...

- A medulla oblongata.
- B corpus callosum.
- C cerebellum.
- D cerebrum.

1.1.3 Adrenalin is carried to the heart ...

- A by blood.
- B along ducts.
- C by lymph.
- D along nerve fibres.

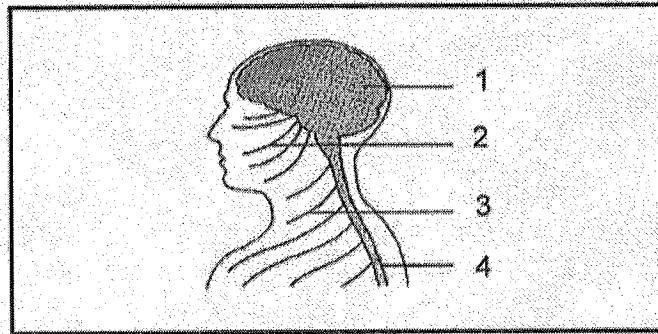
1.1.4 Study the list of hormones below.

- i FSH
- ii Aldosterone
- iii TSH
- iv Growth hormone

Which ONE of the following combinations represents hormones of the pituitary gland?

- A (i), (ii) and (iv) only
- B (i), (iii) and (iv) only
- C (i), (ii) and (iii) only
- D (i) and (iii) only

1.1.5 Study the diagram below.



Which ONE of the following combinations of structures is a part of the central nervous system?

- A 1 and 2
- B 2 and 3
- C 1 and 4
- D 3 and 4

1.1.6 Which ONE of the following is true about altricial offspring?

- A Their eyes are open when born
- B They are able to survive without parental care
- C They are not able to move on their own after birth
- D They are able to feed themselves

1.1.7 Study the factors below.

- i Veld fires
- ii Biodiversity
- iii Drought
- iv Floods

Which ONE of the following combinations of factors INCREASES as a result of global warming?

- A (i), (ii) and (iii) only
- B (i), (iii) and (iv) only
- C (ii), (iii) and (iv) only
- D (i), (ii), (iii) and (iv)

1.1.8 Which ONE of the following will DECREASE food security?

- A Planting more fruit trees
- B Increase in biodiversity
- C Increase in alien plants
- D Controlled use of fertilisers

1.1.9 Study the following statements:

- i Aquatic algae grow rapidly
- ii Species diversity increases over time
- iii Nutrient level of the water increases
- iv Oxygen level in water decreases

Which of the following is a result of eutrophication?

- A (i), (ii) and (iii) only
- B (i), (iii) and (iv) only
- C (i), (ii), (iii) and (iv)
- D (ii), (iii) and (iv) only

1.1.10 The control centre in the body that will be activated when an athlete is dehydrated is the ...

- A pancreas.
- B cerebrum.
- C corpus callosum.
- D hypothalamus.

(10 x 2) (20)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.6) in your ANSWER BOOK.

- 1.2.1 The type of egg that contains yolk and is surrounded by a shell
- 1.2.2 The membrane that develops many blood vessels that enable the transportation of gases absorbed from the air space in the egg
- 1.2.3 The maintenance of a constant internal environment in an organism
- 1.2.4 A small tube inserted in the tympanic membrane that is used to treat children suffering from repeated middle ear infections
- 1.2.5 The hormone released when the body is experiencing shock
- 1.2.6 Having reliable access to a sufficient quantity of affordable, nutritious food to all people

(6 x 1)

(6)

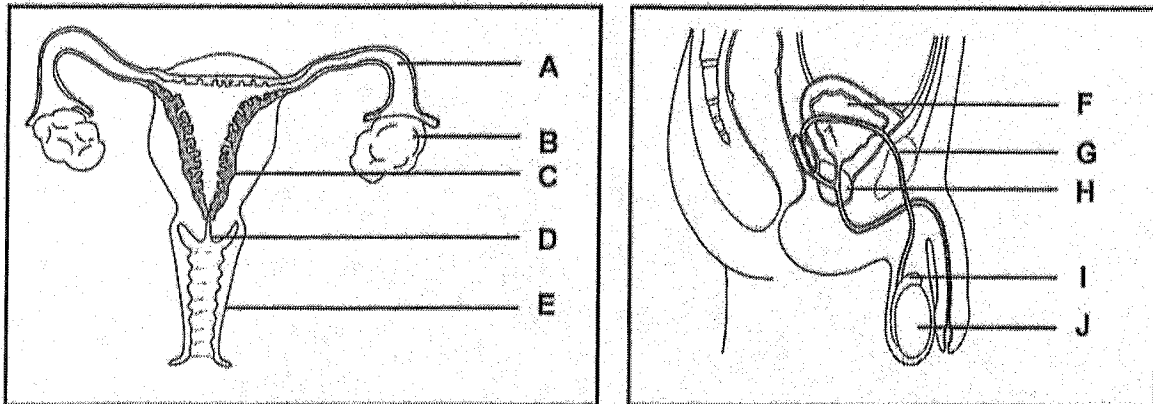
1.3 Indicate whether each of the statements in **COLUMN I** applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in **COLUMN II**. Write **A only**, **B only**, **both A and B**, or **none** next to the question number (1.3.1 to 1.3.7) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Form of reproduction where the female keeps the eggs inside her body until eggs hatch internally	A. Ovovivipary B. Ovipary
1.3.2	Plants that are only found in one specific area and nowhere else in the world	A. Indigenous B. Endemic
1.3.3	The increase of greenhouse gases which causes an increase in heat being trapped inside the atmosphere	A. Ozone depletion B. Enhanced greenhouse effect
1.3.4	Involved in controlling blood glucose concentration	A. Insulin B. Glucagon
1.3.5	Increases variation during gamete formation	A. Crossing over B. Fertilisation
1.3.6	Controls the level of salt in the body	A. Aldosterone B. Adrenalin
1.3.7	Reduces the pest population by the introduction of its natural enemy	A. Biological control B. Chemical control

(7 x 2)

(14)

1.4 Study the sketch of the female and male reproductive systems below and answer the questions that follow.



1.4.1 Write down the LETTER and NAME of the part:

- (a) Where fertilisation would normally take place (2)
- (b) In which implantation takes place (2)
- (c) In which ova are produced (2)
- (d) Responsible for the production of the male hormone (2)

1.4.2 Give the label for part I. (1)

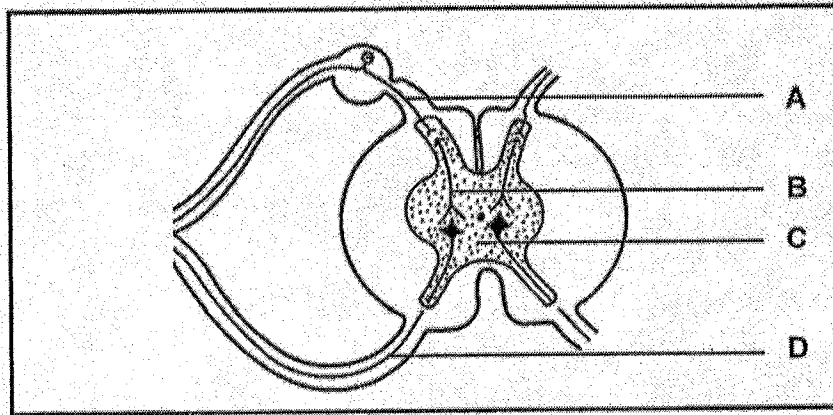
1.4.3 State ONE function of part H. (1)

TOTAL SECTION A: (10)
50

SECTION B

QUESTION 2

2.1 Study the diagram below and answer the following questions.



2.1.1 Write down the LETTER only for the part that transmits impulses away from the spinal cord. (1)

2.1.2 Give the function of part B. (1)

2.1.3 Make a labelled drawing showing the structure of neuron A. (5)

2.1.4 Explain the significance of a reflex action. (2)

2.1.5 A motorcyclist was in a serious accident, injuring his hand.

Explain why he was able to feel but could not move his fingers. (4)

(13)

2.2 A student conducted an investigation to determine the effect of distance on the curvature (thickness) of the lens of the human eye.

1. The student sat in a well-lit room.
2. The student covered one eye with an eye patch.
3. A pencil was held in front of the student's uncovered eye for 10 seconds.
4. The student focussed on the pencil until a clear image could be seen and at the same time the curvature of the lens of the student's eye was measured with an optical instrument.
5. The pencil was then moved to different distances from the eye and the curvature of the lens of the eye was measured at each new distance.

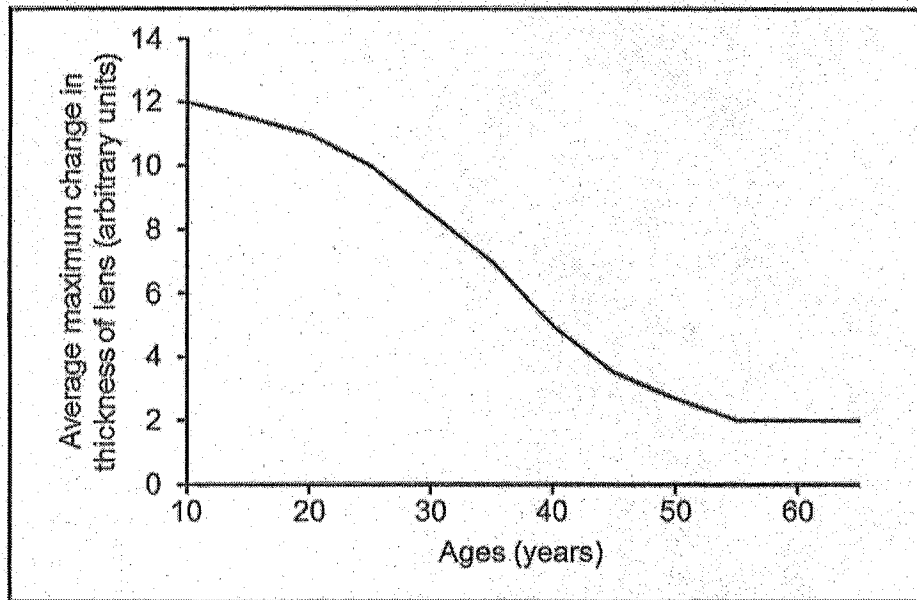
The results of the investigation are shown in the table below.

DISTANCE OF THE PENCIL FROM THE EYE (cm)	CURVATURE OF THE LENS OF THE EYE (mm)
10	4,0
20	3,6
30	3,2
50	2,9
100	2,7
150	2,6

- 2.2.1 State a possible hypothesis for the investigation. (2)
- 2.2.2 State any TWO other factors that should be kept constant in the investigation. (2)
- 2.2.3 Explain the changes in the curvature of the lens during the investigation. (5)

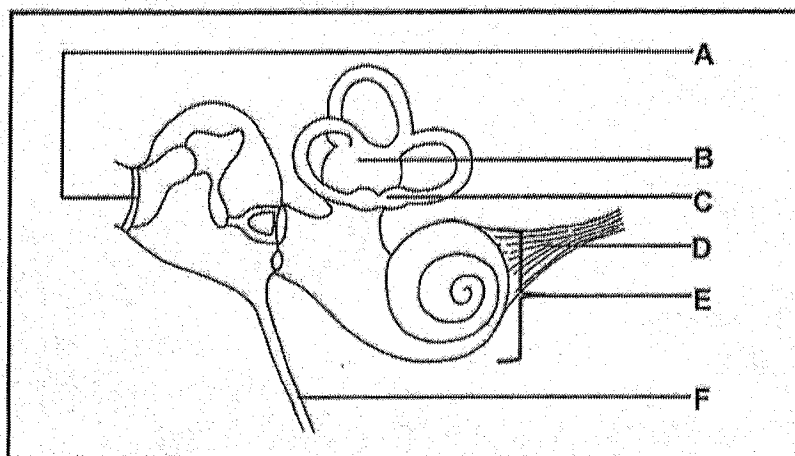
(9)

- 2.3 Data was collected using a similar procedure as described in QUESTION 2.2 and a graph was drawn.



- 2.3.1 At around what age does the lens lose its ability to change shape? (1)
- 2.3.2 If a person loses the ability to change the shape of their lens, explain the effect this could have on the person's eyesight. (2)
- 2.3.3 People between the age of 20 and 40 using glasses are advised to change them every two years after retesting their eyesight. Explain why this would be necessary. (3)
- (6)

2.4 Study the following diagram and answer the following questions.

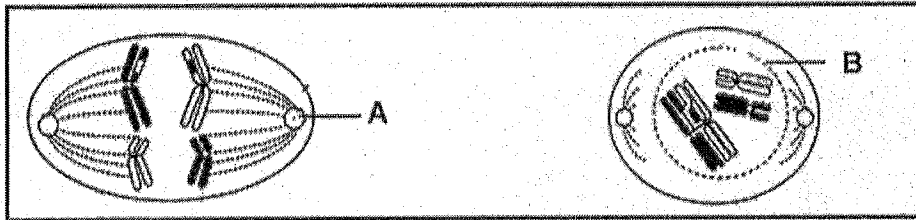


- 2.4.1 Label part E. (1)
- 2.4.2 State ONE function of part D. (1)
- 2.4.3 Write down the LETTER and NAME of the part responsible for equal pressure of both sides of part A. (2)
- 2.4.4 Explain what would happen if part A has a hole in it. (3)
- (7)
- 2.5 Describe the changes that would take place to restore balance when the thyroxin level in the body is too low. (5)

TOTAL QUESTION 2: (40)

QUESTION 3

- 3.1 Study the diagrams below of animal cells showing different stages of cell division and answer the questions that follow.



- 3.1.1 Identify parts:

- (i) A (1)
(ii) B (1)

- 3.1.2 Give TWO observable reasons why the phases in the diagram are part of meiosis I. (2)

- 3.1.3 Could the cell represented be that of a human? (1)

- 3.1.4 Explain your answer to QUESTION 3.1.3. (1)

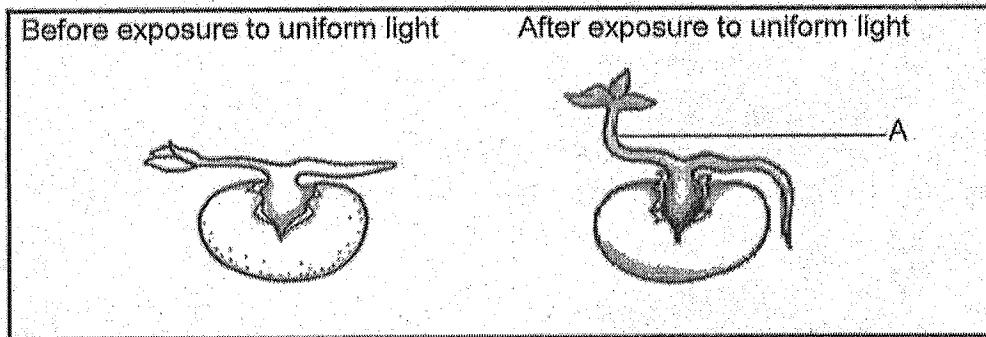
- 3.1.5 State THREE ways in which this type of cell division is biologically important. (3)
(9)

- 3.2 The following table shows the total amount of solid waste and the amount of recyclable material dumped in a South African city landfill site over a number of years.

YEAR	TOTAL AMOUNT OF SOLID WASTE (MILLIONS OF TONNES)	AMOUNT OF RECYCLABLE MATERIAL IN SOLID WASTE (MILLIONS OF TONNES)
2003	1.49	0.75
2004	1.59	0.80
2005	1.80	1.50
2006	1.95	1.30

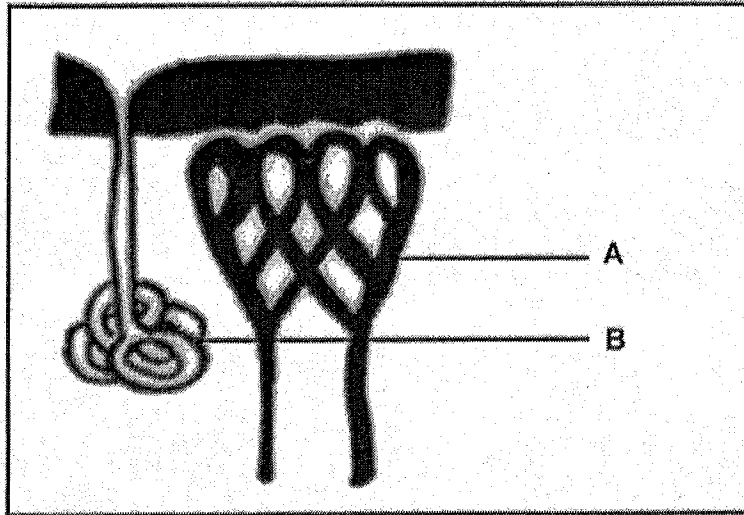
- 3.2.1 Describe the trend for the total amount of solid waste in the city landfill site. (2)
- 3.2.2 Suggest ONE reason for the trend described in QUESTION 3.2.1. (1)
- 3.2.3 Give TWO reasons why the recycling of waste is advantageous. (2)
- 3.2.4 Explain how poor management of landfill sites can affect the water quality in a city. (2)
- 3.2.5 Draw a bar graph to illustrate the changes in the amount of recyclable waste over time. (6)
- (13)

- 3.3 Study the following illustration of a bean seedling that had been placed horizontally on moist cotton wool. During the investigation the seedling had UNIFORM light exposure for four days. After a few days the part labelled A started to grow upwards.



- 3.3.1 Identify the specific tropism illustrated by the growth at A. (1)
- 3.3.2 Name the hormone responsible for the growth movement illustrated above. (1)
- 3.3.3 Describe how the hormone mentioned in QUESTION 3.3.2 led to the upward growth of part A. (4)
- 3.3.4 A rotating clinostat overcomes the effect of gravity.
Explain the difference in results if this investigation was set up on a rotating clinostat. (2)
- 3.3.5 State TWO ways in which the reliability of the investigation can be improved. (2)
- (10)

3.4 Study the diagram below representing the human skin and answer the following questions.



3.4.1 Give the label for part:

- (i) A (1)
- (ii) B (1)

3.4.2 Name the heat regulation centre in the brain. (1)

3.4.3 Explain the consequences if part A cannot constrict. (5)
(8)

TOTAL QUESTION 3: 40
TOTAL SECTION B: 80

SECTION C

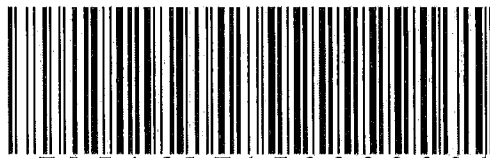
QUESTION 4

Name the hormones produced by the testes and ovaries and describe the role of each hormone in puberty and in the reproductive process.

Content: (17)
Synthesis: (3)
(20)

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150



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Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES P1
MEMORANDUM
PREPARATORY EXAMINATION
SEPTEMBER 2016

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MARKS: 150

N.B. This memorandum consists of 11 pages including this page.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2016

- 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 part of it is required**
Read all and credit relevant part.
- 4. If comparisons are asked for and descriptions are given**
Accept if 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 is incorrect, do not credit. If sequence and links becomes correct again, resume credit.
- 9. Non-recognised abbreviations**
Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of 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 recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.
- 13. If common names given in terminology**
Accept provided it was accepted at the National memo discussion meeting.

14. If only letter is asked for and only name is given (and vice versa) No 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

18. Code-switching of official languages (terms and concepts) A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator

SECTION A

QUESTION 1

- 1.1 1.1.1 C ✓✓✓
- 1.1.2 A ✓✓
- 1.1.3 A ✓✓
- 1.1.4 B ✓✓
- 1.1.5 C ✓✓
- 1.1.6 C ✓✓
- 1.1.7 B ✓✓
- 1.1.8 C ✓✓
- 1.1.9 B ✓✓
- 1.1.10 D ✓✓

(10 x 2) (20)

- 1.2 1.2.1 Amniotic egg ✓
- 1.2.2 Chorion ✓
- 1.2.3 Homeostasis ✓
- 1.2.4 Grommet ✓
- 1.2.5 Adrenalin ✓
- 1.2.6 Food security ✓

(6 x 1) (6)

- 1.3 1.3.1 A only ✓✓
- 1.3.2 B only ✓✓✓
- 1.3.3 B only ✓✓
- 1.3.4 Both A and B ✓✓
- 1.3.5 A only ✓✓
- 1.3.6 A only ✓✓
- 1.3.7 A only ✓✓

(7 x 2) (14)

- 1.4 1.4.1 (a) A ✓ Fallopian tube ✓
- (b) C ✓ Endometrium ✓
- (c) B ✓ Ovary ✓
- (d) J ✓ Testis ✓

(2) (2) (2) (2)

- 1.4.2 Epididymis ✓ (1)
- 1.4.3 - Secrete fluid assisting in movement of sperm ✓
- Nourishment of the sperm ✓

(Any 1) (1) (1)

TOTAL SECTION A: 50 (10)

SECTION B

QUESTION 2

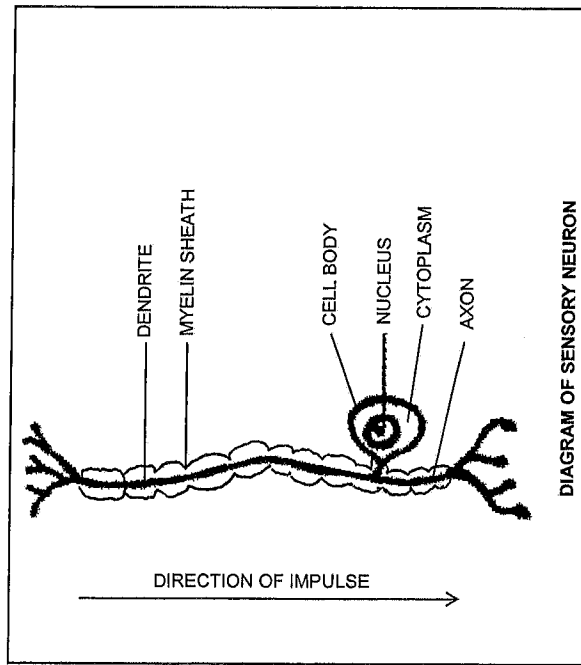
2.1 2.1.1 D ✓

(1)

2.1.2 Connects the sensory neuron to the motor neuron ✓ / pass impulses from sensory neuron to the motor neuron

(1)

2.1.3



Mark allocation: Caption ✓

Correct type of neuron drawn ✓

Any 3 correct labels ✓✓✓

(5)

2.1.4 - Helps to protect the body ✓

- by reacting fast ✓

(2)

2.1.5 - Sensory neuron is not damaged ✓

- so impulses were transmitted to the spinal cord ✓ / brain

- Motor neuron might be damaged ✓

- so impulses could not be sent to the muscles ✓ to move the fingers

(4)

(13)

2.2

2.2.1 As the distance of the pencil from the eye increases/decreases, the curvature of the lens increases/decreases ✓✓

OR

The distance of the pencil from the eye has no effect on the curvature of the lens ✓✓

(2)

2.2.2 Cover the same eye ✓

Use the same pencil ✓

Same time of day ✓

Same person doing the readings ✓

Same environmental factors ✓ / an e.g. of an environmental factor

Same optical instrument to measure the thickness of the lens ✓ / same instrument used to measure distance of the pencil from the eye

(Mark first TWO only)

(any 2) (2)

2.2.3 - As the pencil was moved further away ✓ from the eye

- the curvature of the lens decreased ✓

- Accommodation occurs ✓

- Ciliary muscles relax ✓

- Suspensory ligaments tighten ✓ / become taut

- Tension on the lens increases ✓

- The lens becomes less convex ✓ / flatter

Any (5)

(9)

2.3

2.3.1 54 - 56 ✓ years

(1)

2.3.2 - Accommodation ✓ will be affected

- near and distant objects will not be seen clearly ✓

(2)

2.3.3 - The lens ability to change/elasticity is decreasing ✓

- Lens with new convexity is required ✓

- to compensate for the loss of elasticity ✓ over time

(3)

2.4

2.4.1 Cochlea ✓

(1)

2.4.2 Conducts nerve impulses to the cerebrum ✓ / brain / cerebellum

(1)

2.4.3 F ✓ - Eustachian tube ✓

(2)

2.4.4 - Part A will not be able to vibrate ✓

- No vibrations will be transmitted ✓ to the membrane of the oval window/ ossicles/ inner ear

- Hearing will be affected ✓ / deafness may result

(3)

- 2.5
- The pituitary gland is stimulated✓
 - to secrete more TSH✓
 - The TSH causes the thyroid gland✓
 - to secrete more thyroxin✓
 - until normal level is reached✓

(5)

TOTAL QUESTION 2: 40

QUESTION 3

3.1

- 3.1.1 (i) Centriole✓
(ii) Nuclear membrane✓

(1)
(1)

3.1.2 - Crossing over✓/is taking / has taken place

- Chromosomes move to poles✓
- Bivalents (homologous chromosomes) are in pairs✓

(Any 2) (2)

3.1.3 No✓

(1)

3.1.4 Humans have 23 pairs / 46 chromosomes and this diagram only shows 4 chromosomes / 2 pairs✓

(1)

3.1.5 - It increases genetic variation ✓

- Reduces the number of chromosomes by half ✓
- Results in the formation of gametes✓
- Ensures that the chromosome number remains constant within species ✓

(Any 3) (3)
(9)

3.2

3.2.1 - The amount of solid waste increased✓
- from 2003 to 2006✓/over time

(2)

3.2.2 - Increase of the population✓

- Urbanisation✓
- Communities have access to an increased standard of living✓
- Surplus resources✓
- Increase in public awareness✓/ education

(Any 1) (1)

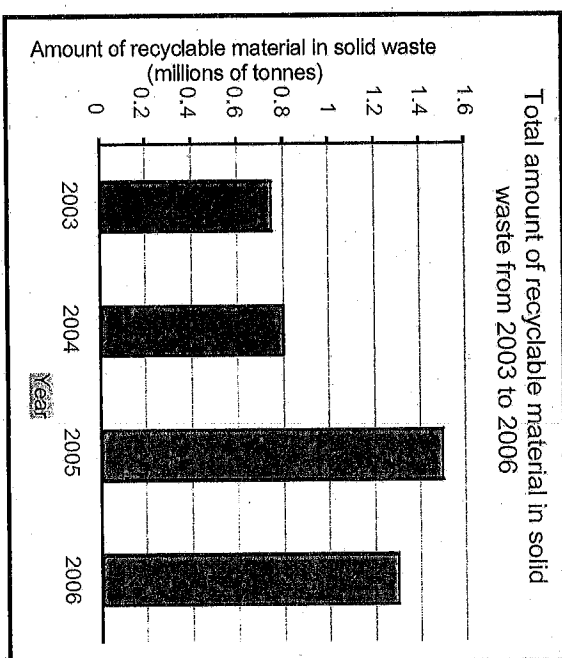
3.2.3 - Reduce the demand on natural resources✓

- Contributes to the conservation of natural habitats✓
- Less space is needed for landfill✓
- Generates an income ✓
- Decreases pollution ✓

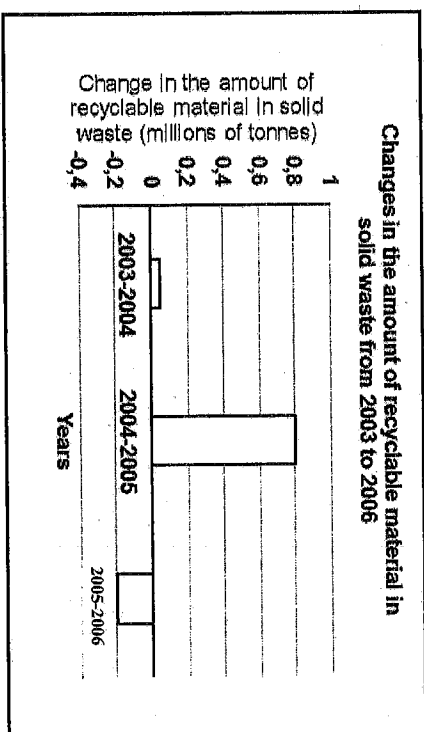
(Any 2) (2)

3.2.5

- 3.2.4 - Leaching can occur✓
- waste leaks into the soil and enters the ground water✓
- Waste will spill over into rivers causing pollution ✓/ eutrophication
- (Any 2) (2)



OR



Marking guideline:

Criteria	Mark allocation
Correct caption of the graph	✓
Correct type of graph	✓
Labelling of X-axis and Y-axis with units	✓
Scale of X-axis and Y-axis	✓
Correct plotting of all the bars	✓✓
OR	
Correct plotting of 1 to 3 of the bars	✓

(6)
(13)

3.3

3.3.1 Phototropism ✓ / Geotropism

(1)

3.3.2 Auxins ✓

(1)

3.3.3 - There is uneven distribution ✓ of auxins

- More auxins accumulate on the lower side of the stem ✓

- due to light ✓ /gravity

- Higher auxin concentration on lower side of the stem stimulates cell elongation in this area ✓

- the lower concentration on the upper side inhibited cell elongation in this area ✓

- and part A grew upwards

(4)

3.3.4 The distribution of auxins would be even across the stem ✓

There will be horizontal growth ✓/no change in the direction of growth.

OR

There will be no change in the result ✓/ stem will still grow upwards
Under the influence of light ✓

(2)

3.3.5 Increase the sample size ✓/ the number of bean seeds

Repeat the investigation ✓

(2)
(10)

3.4

3.4.1 (i) Blood vessels ✓ / capillaries
(ii) Sweat gland ✓(1)
(1)

3.4.2 Hypothalamus ✓

(1)

3.4.3 Blood vessels will remain dilated ✓/ the same

Blood flow to the skin will remain high ✓

More heat will be lost through radiation ✓

Increase in sweat production ✓

Body temperature would decrease ✓ below normal

(5)
(8)

TOTAL QUESTION 3: 40

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Testosterone✓:

- Produced by the seminiferous tubules✓/ testes
- The production of sperm✓ in the testis

During puberty testosterone stimulates the development of secondary sexual characteristics in the male✓ in the following ways:

- The deepening of the voice✓ as vocal cords elongate in the larynx
- The development of muscles✓
- The growth of facial, pubic and body hair✓
- Development of the penis and testis✓ (max 5) (5)

Oestrogen✓:

- Produced by the (Graafian) follicles✓ in the ovaries
- Causes the lining of the uterus / endometrium to become thicker✓
- in preparation for a possible implantation✓

During puberty oestrogen stimulates the development of secondary sexual characteristics in the female✓ in the following ways:

- Widening of the pelvis✓
- Growth and development of breasts✓
- Growth of the female sex organs✓
- Growth of pubic and armpit hairs ✓
- The start of the menstrual cycle, ovulation and menstruation ✓ (max 7) (7)

Progesterone✓:

- Produced by the corpus luteum✓
- Progesterone causes further thickening✓ of the endometrium
- so that it is ready for implantation✓ of the embryo should fertilisation occur
- High levels of progesterone✓
- inhibits the secretion of FSH✓
- which in turn prevents the further development of any new ovum in the ovary✓ (max 5)(5)

ASSESSING THE PRESENTATION OF THE ESSAY

Relevance	Logical sequence	Comprehensive
All information provided is relevant to the topic	Ideas arranged in a logical/cause-effect sequence	Answered all aspects required by the essay in sufficient detail
Only information relating to the specific three hormones included (There is no irrelevant information)	Hormones appropriately linked to their functions	All 3 hormones mentioned and at least 3 facts relating to each of the three hormones have been given (12/17)
R	L	C
TOTAL SECTION C: 20		

GRAND TOTAL: 150