education

Department:
Education
PROVINCE OF KWAZULU-NATAL

NATIONAL
SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

PREPARATORY EXAMINATION

SEPTEMBER 2020

MARKS: 150

TIME: $2^1/_2$ hours

N.B. This question paper consists of 15 pages including this page.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the 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. Make ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

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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.

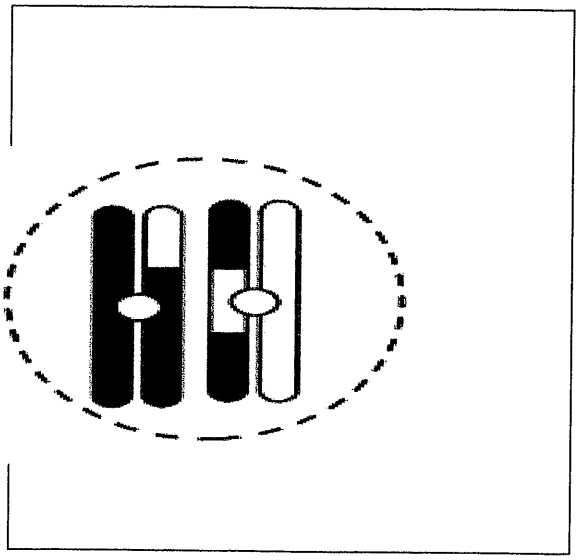
1.1.1 Which ONE of the following hormones is responsible for the development of secondary sexual male characteristics?

A FSH
B Testosterone
C Oestrogen
D Progesterone

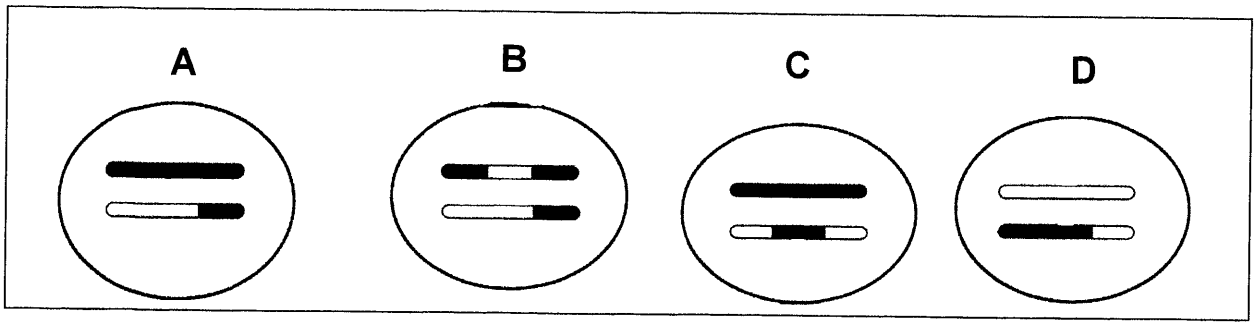
1.1.2 The site for fertilisation in a human female is the ...

A vagina
B cervix
C oviduct
D uterus

1.1.3 The diagram below shows a cell in a phase of meiosis.



Which ONE of the following is a gamete formed from the cell above.



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1.1.4 The following relates to meiosis:

(i) Prophase I
(ii) Metaphase I
(iii) Prophase II
(iv) Telophase II

Which ONE of the following combinations is most likely to contribute to genetic variation amongst offspring?

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

1.1.5 The advantage of the testes located in the scrotum, outside the body cavity:

A More sperm can be stored in the scrotum.
B Sperm development is more successful at temperatures below body temperature.
C Allows time for secretion of testestorone.
D Allows time for secretions of accessory glands.

1.1.6 The part of the brain that is responsible for higher thought processes is the ...

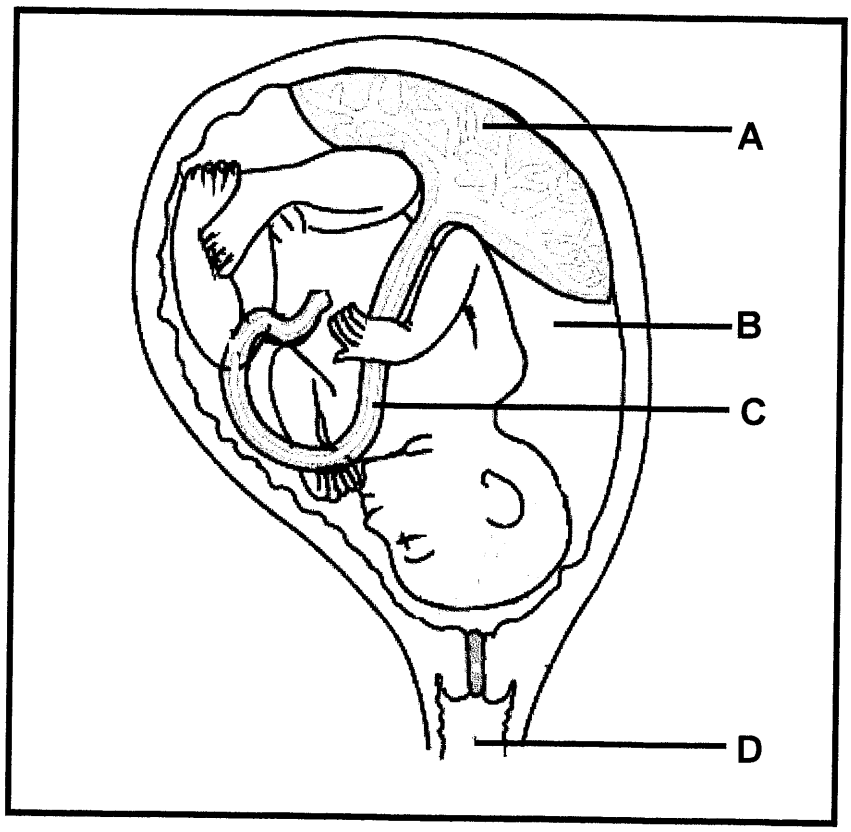
A cerebellum.
B medulla oblongata.
C hypothalamus.
D cerebrum.

1.1.7 The autonomic nervous system is made up of the ...

A cranial and sympathetic nerves.
B sympathetic nerves and spinal cord.
C sympathetic and parasympathetic nerves.
D parasympathetic and peripheral nerves.

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QUESTION 1.1.8 AND 1.1.9 ARE BASED ON THE FOLLOWING DIAGRAM.



1.1.8 Which ONE of the following is the correct label and function?

PART	FUNCTION
A – Placenta	Keeps the foetus hydrated
B - Cervix	Absorbs mechanical shock
C – Umbilical cord	Allows free foetal movements
D – Vagina	Serves as birth canal

1.1.9 Below is a list of possible consequences.

(i) Nutrients will not be sent to the baby
(ii) Toxic substances will accumulate around the baby
(iii) The baby will be dehydrated
(iv) FSH levels will start to increase

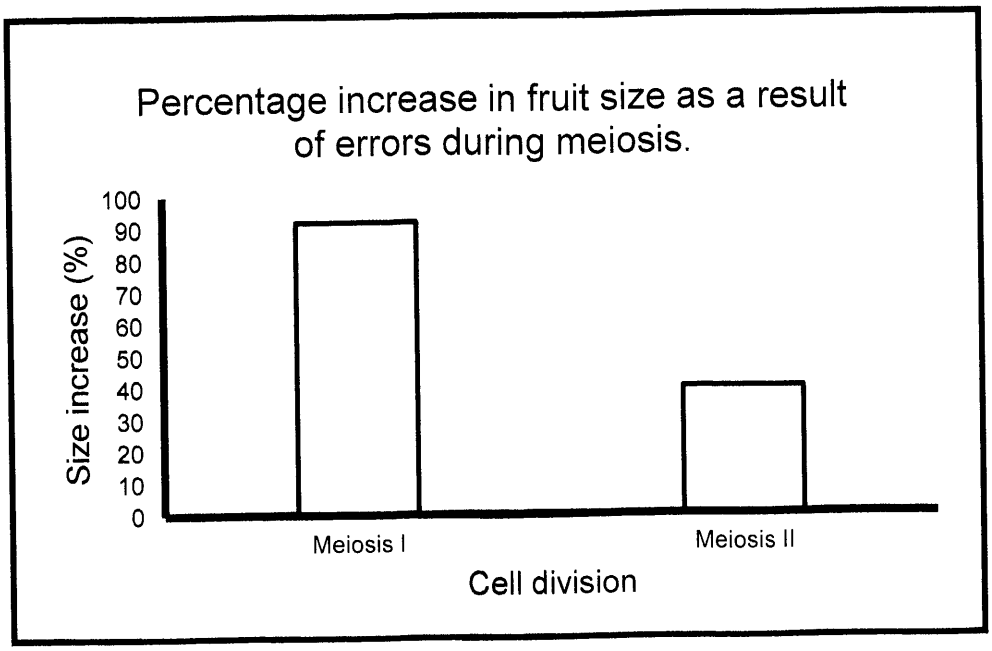
Which of the following combinations will result if part **C** was completely blocked?

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

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1.1.10 In an investigation that was conducted among peach plants it was found that the fruit size was affected by errors that occurred during meiosis.

The graph below shows the results obtained.



The conclusion from the graph is that ...

A Errors in meiosis I are more beneficial to farmers than errors in meiosis II.
B Errors in meiosis I and II have the same effect on the size of peaches.
C Errors in meiosis II have more advantage to consumers than errors in meiosis I.
D Errors in meiosis I have more disadvantage to farmers than errors in meiosis II.

(10 x 2) **(20)**

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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 1.2.9) in the ANSWER BOOK.

1.2.1 Part of the human ear that directs sound waves into the auditory canal

1.2.2 The outermost extra-embryonic membrane surrounding the foetus

1.2.3 The hormone that regulates the salt concentration in the human body

1.2.4 Structure in the animal cell that form spindle fibres during cell division

1.2.5 The hormone that stimulates milk production

1.2.6 The period of development of an embryo in the uterus, between fertilisation and birth

1.2.7 The structure in the head of a sperm cell that contains enzymes which break down the membrane surrounding the ovum

1.2.8 Muscular organ in males used to deposit sperms into the female

1.2.9 The duct leading from the testis to the urethra in human males

(9 x 1) **(9)**

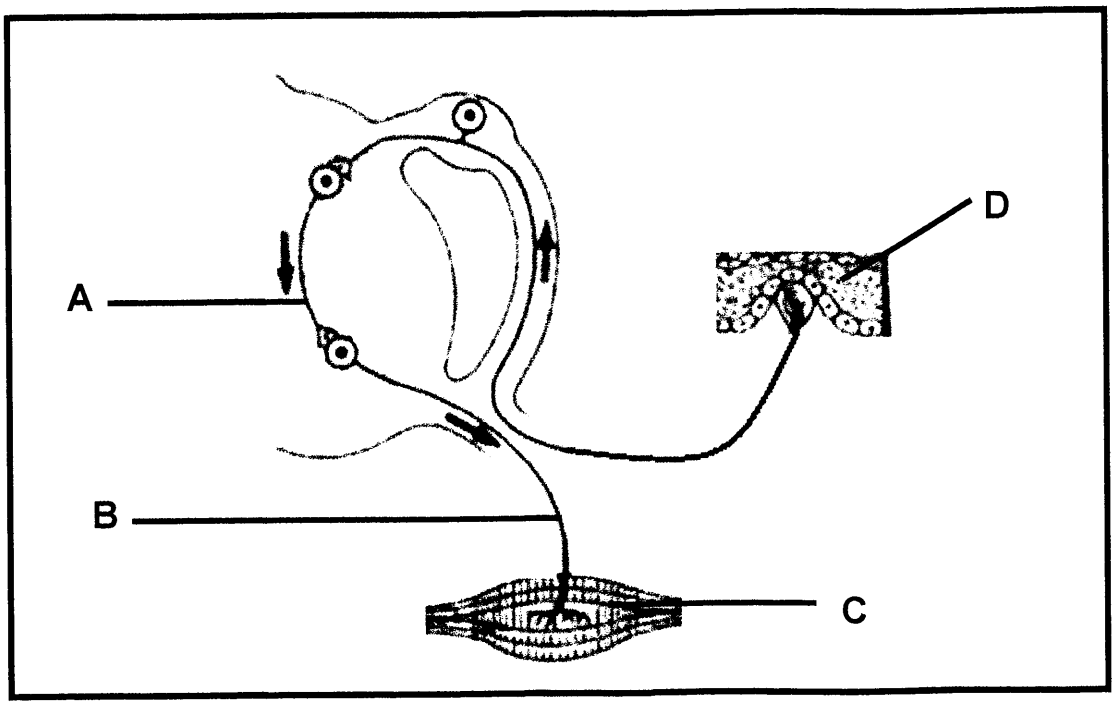
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	DNA replication takes place	A: Prophase I B: Anaphase II
1.3.2	Random arrangement occurs	A: Metaphase I B: Metaphase II
1.3.3	Carries nutrients from placenta to the foetus	A: Umbilical vein B: Umbilical artery
1.3.4	Division of the cytoplasm	A: Cytokinesis B: Karyokinesis

(4 x 2) **(8)**

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1.4 Study the diagram below, which shows a reflex arc.



1.4.1 Identify parts:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

(d) **D** (1)

1.4.2 Explain ONE significance of a reflex action. (2)
(6)

1.5 Study the following diagrams showing one day old hatchlings.

DIAGRAM A



DIAGRAM B



1.5.1 Which diagram (**A** or **B**) shows precocial development? (1)

1.5.2 Give ONE visible reasons from the diagram to support your answer to QUESTION 1.5.1 (1)

1.5.3 Which animal (**A** or **B**) needs greater degree of parental care? (1)

1.5.4 Give ONE reason for your answer to QUESTION 1.5.3. (1)

1.5.5 State whether animal **A** is oviparous or ovoviviparous. (1)

1.5.6 Explain why hatchling in diagram **B** would have had smaller yolk than the hatchling in diagram **A**. (2)
(7)

TOTAL SECTION A: 50

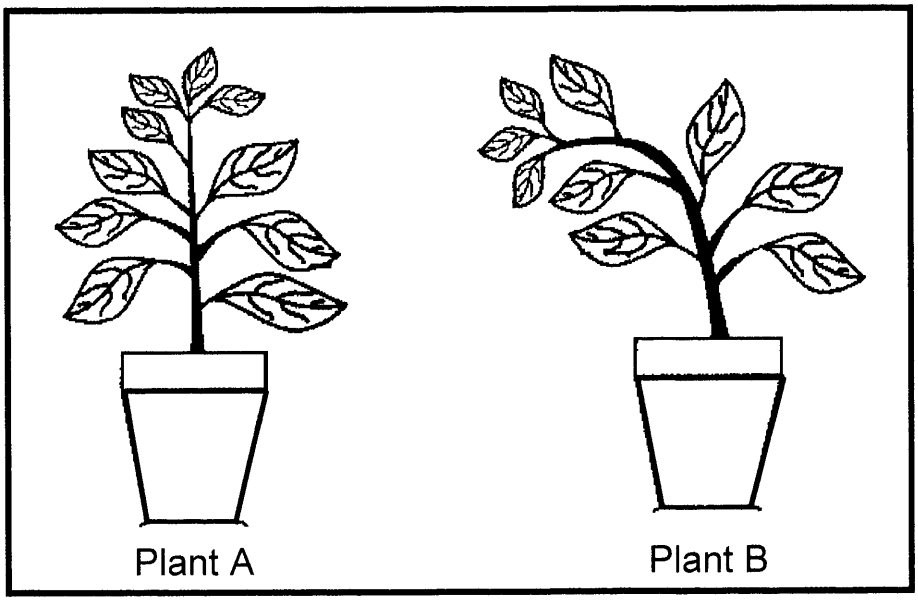
SECTION B

QUESTION 2

2.1 In an investigation to determine the effect of light on the growth of a potted plant, the following steps were followed:

- Two potted plants of the same species were used
- One was placed on top of the cupboard exposed to light from all directions
- Another was placed inside a box with light coming from one side only
- Both the plants were left for one week.

The diagrams below show results after 1 week.



2.1.1 State the:

(a) dependent variable (1)

(b) independent variable (1)

2.1.2 Name the plant hormone responsible for the growth response being investigated. (1)

2.1.3 State TWO factors that were kept constant during the investigation. (2)

2.1.4 Suggest TWO ways to improve reliability of the results. (2)

2.1.5 Which plant (**A** or **B**) was placed on top of the cupboard? (1)

2.1.6 Explain your answer to QUESTION 2.1.5. (2)

2.1.7 Explain the plant response observed in plant **B**. (5)
(15)

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2.2 An ear has two main functions namely: hearing and maintaining balance.

2.2.1 Name the part of an ear that converts pressure waves into an impulse. (1)

2.2.2 Explain the consequence if the ossicles could not vibrate. (3)

2.2.3 Describe the role of the different parts of an ear in maintaining balance. (6) **(10)**

2.3 Read the following passage.

Alzheimer's disease is a progressive disorder that causes brain cells to waste away (degenerate) and die. Alzheimer's disease is the most common cause of dementia which is a continuous decline in thinking, behavioural and social skills that disrupts a person's ability to function independently.

The early signs of the disease may be forgetting recent events or conversations. As the disease progresses, a person with Alzheimer's disease will develop severe memory impairment and lose the ability to carry out everyday tasks.

The table below shows the prevalence of Alzheimer's disease in a country.

Age(years)	Alzheimer's disease cases/1000 people.
65-69	5
70-74	8
75-79	20
80-84	80
85-89	170
90-94	310
≥95	500

2.3.1 State TWO types of skills, mentioned in the passage, that decline due to Alzheimer's disease. (2)

2.3.2 Which age group has the lowest cases of Alzheimer's disease? (1)

2.3.3 Describe the relationship between the age and the incidence of Alzheimer's disease. (2)

2.3.4 Explain the academic impact on a Grade 12 learner who suffers from a severe Alzheimer's disease. (2)

2.3.5 Draw a labelled diagram of a sensory neuron. (4) **(11)**

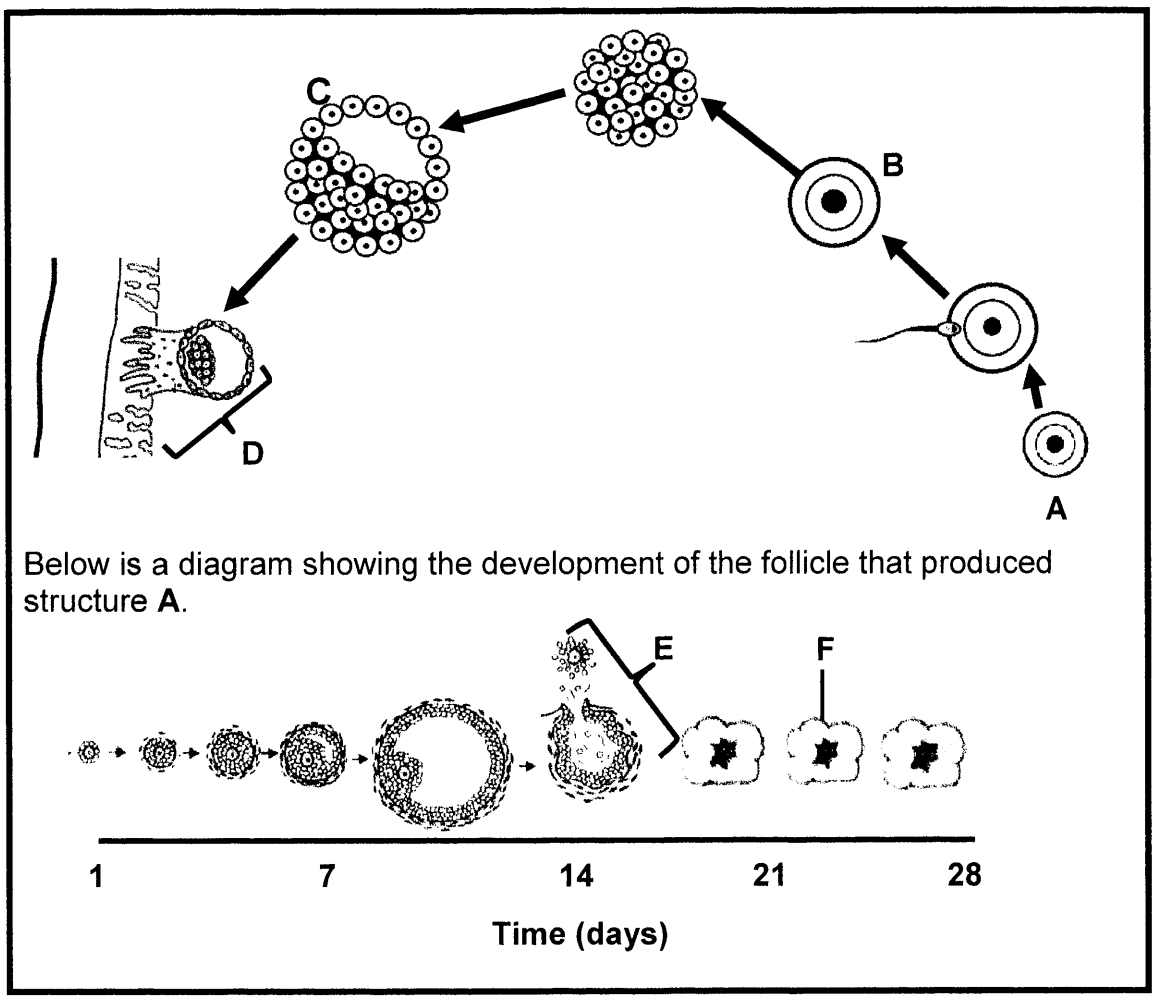
2.4 Describe how adrenalin maintains high energy levels in the body during an emergency. **(4)**

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[40]

QUESTION 3

3.1 Study the following diagram.



3.1.1 Identify:

(a) Structure **A** (1)

(b) Hormone responsible for process **E**. (1)

(c) Process **D** (1)

3.1.2 Name the hormone produced by the follicle before process **E**. (1)

3.1.3 How many chromosomes does structure **B** have? (1)

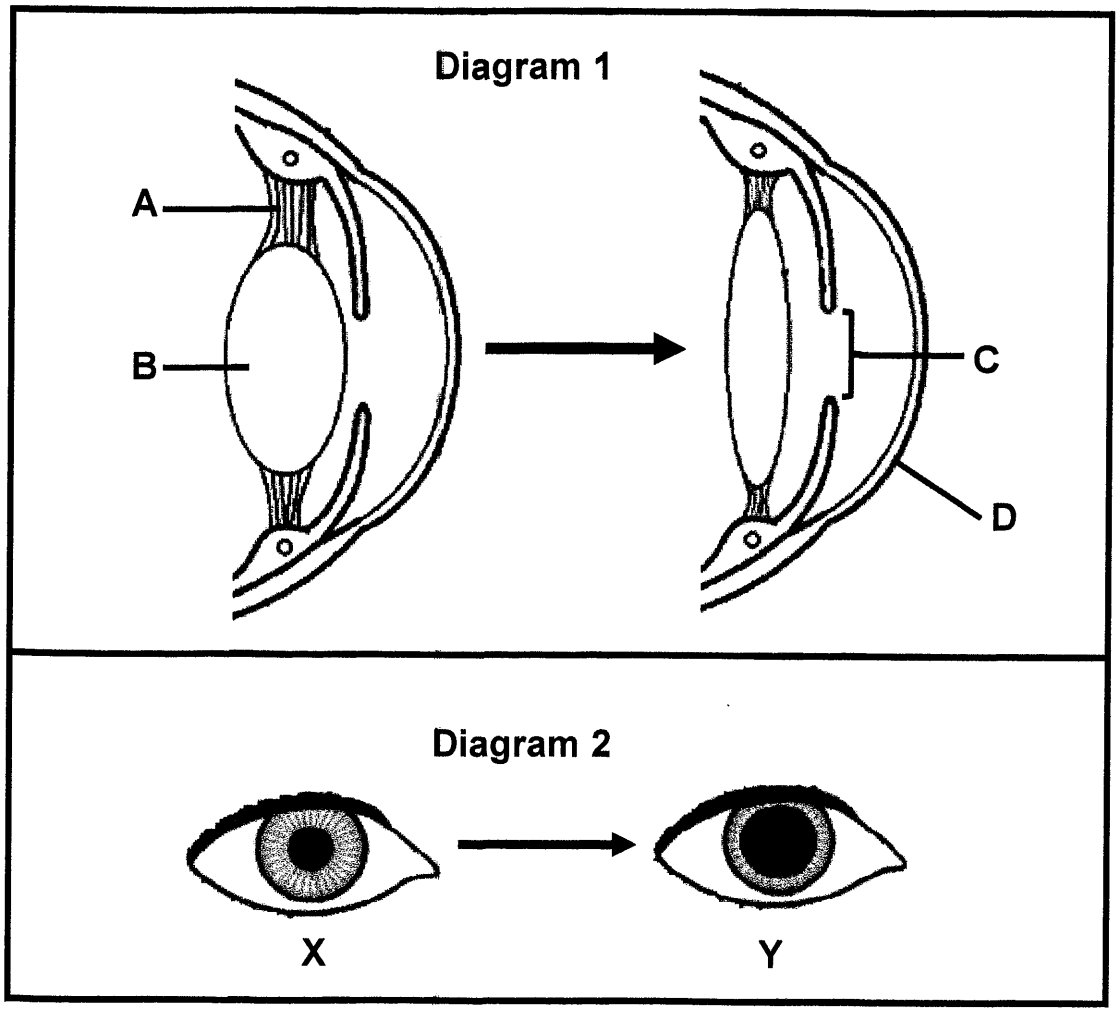
3.1.4 On which day was structure **A** released? (1)

3.1.5 Describe the development from **B** until it forms structure **C**. (4)

3.1.6 Explain the consequence in a 25 year old female with regard to the ovarian cycle if her pituitary gland does not secrete hormones. (4)

3.1.7 Explain the importance of structure **F** remaining constant after process **E**. (3)
(17)

3.2 The diagrams below show two responses of the human eye.



3.2.1 Write down the LETTER and the NAME of the part:

(a) That controls the amount of light entering the eye (2)

(b) Is affected when a person has cataracts (2)

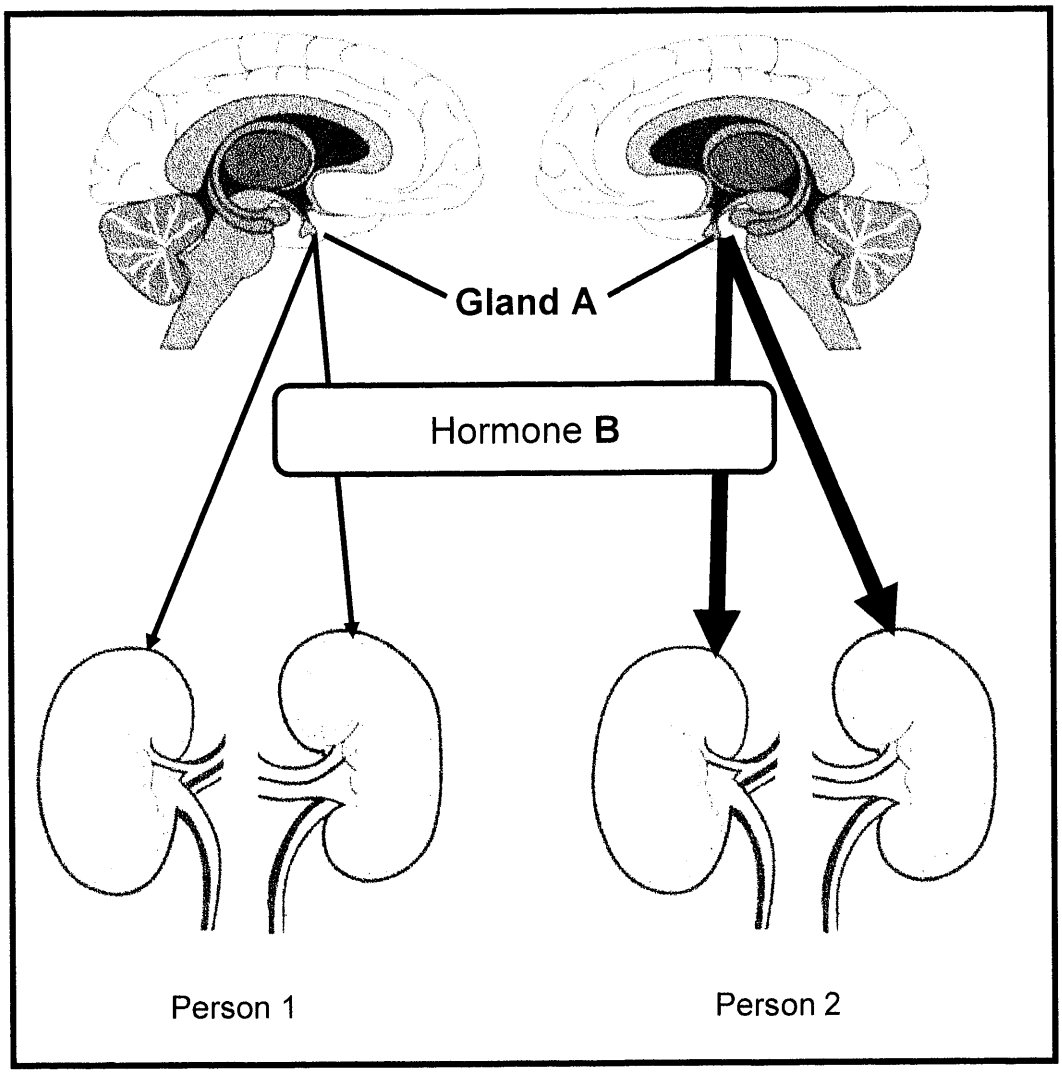
3.2.2 Name the process responsible for the changes that took place in diagram 1. (1)

3.2.3 Name the stimulus that brought about the changes shown in diagram 2. (1)

3.2.4 Explain the changes that occurred from **X** to **Y**. (3)

3.2.5 Describe TWO ways in which part **D** is adapted for its function. (4)
(13)

3.3 Study the following diagram on water regulation in two people. The thickness of an arrow indicates the amount of hormone **B**. Thick line indicates large amount of secretion.



3.3.1 Identify:

(a) Gland **A**. (1)

(b) Hormone **B**. (1)

3.3.2 Which person (**1** or **2**) will produce a dilute urine? (1)

3.3.3 Explain the consequence with regards to the volume of water in the blood if gland **A** had a prolonged over secretion of hormone **B**. (3)

3.3.4 Explain why a large volume of urine will be formed in person **1** than in person **2**. (4)

(10)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Describe the effect of low insulin secretion in the body and describe how the body regulates temperature on a hot day. Also describe the negative feedback involving thyroxin and TSH during **and** after exercise.

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

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

TOTAL SECTION C: 20
GRAND TOTAL: 150


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GRADE 12

LIFE SCIENCES P1

PREPARATORY EXAMINATION

MARKING GUIDELINE

SEPTEMBER 2020

MARKS: 150

TIME: 2½ hours

This memorandum consists of 10 pages.

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PRINCIPLES RELATED TO MARKING LIFE SCIENCES

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 a part of it is required**
   Read all and credit the relevant part.

4. **If comparisons are asked for, but descriptions are given**
   Accept if the 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 are incorrect, do not credit. If sequence and links become correct again, resume credit.

9. **Non-recognised abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the 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 recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the national memo discussion meeting.

14. **If only the letter is asked for, but only the name is given (and vice versa)**
    Do not 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.

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SECTION A

QUESTION 1

1.1 1.1.1 B✓✓

1.1.2 C✓✓

1.1.3 D✓✓

1.1.4 C✓✓

1.1.5 B✓✓

1.1.6 D✓✓

1.1.7 C✓✓

1.1.8 D✓✓

1.1.9 A✓✓

1.1.10 A✓✓ (10 x 2) **(20)**

1.2 1.2.1 Pinna✓

1.2.2 Chorion✓

1.2.3 Aldosterone✓

1.2.4 Centrosome✓/(Centrioles)

1.2.5 Prolactin✓

1.2.6 Gestation✓

1.2.7 Acrosome✓

1.2.8 Penis✓

1.2.9 Vas deferens✓

(9 x 1) **(9)**

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1.3	1.3.1	None✓✓			(2)
	1.3.2	Both A and B✓✓			(2)
	1.3.3	A only✓✓			(2)
	1.3.4	A only✓✓			(2)
					(**8**)
1.4	1.4.1	(a) Inter neuron✓/Connector neuron / Axon			(1)
		(b) Motor neuron✓ / Axon			(1)
		(c) Effector✓/muscle			(1)
		(d) Receptor✓			(1)
	1.4.2	- Response is quick✓ and automatic - To minimise injury to the body✓.			(2)
					(6)
1.5	1.5.1	A✓			(1)
	1.5.2	Offspring has opened eyes✓ Standing/walking by itself✓ Body covered in feathers✓ **(Mark the first ONE only)**		(Any)	(1)
	1.5.3	B✓			(1)
	1.5.4	Can't feed itself✓ Can't move by itself✓ Has closed eyes✓ No feathers✓ **(Mark the first ONE only)**		(Any)	(1)
	1.5.5	Oviparous✓			(1)
	1.5.6	It is not fully developed✓/it is under developed indicating less nourishment✓. **OR** Due to a lack of resources/unfavourable conditions in the environment✓ egg formation was poor✓			(2)
					(5)
				TOTAL SECTION A:	**50**

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SECTION B

QUESTION 2

2.1 2.1.1 (a) Direction of growth of a plant✓ (1)

(b) Direction of light✓ (1)

2.1.2 Auxins✓ (1)

2.1.3
- Same species of plant✓
- Same period of exposure to light ✓ (Any 2) (2)

2.1.4
- Repeat the investigation✓
- Increase the sample size✓.

(Mark the FIRST TWO ONLY) (2)

2.1.5 A✓ (1)

2.1.6
- It grew straight up✓/vertically
- because it was receiving light from all directions✓ (2)

2.1.7
- light came from one direction✓
- auxins produced from the apex of the plant✓
- moved to the darker side✓
- high concentration of auxins on the darker side✓
- stimulate cell elongation on the dark side✓
- low concentration of auxins on the light side✓
- slows down elongation of the cells✓
- leading to the plant bending towards light✓. (Any 5) (5)

(15)

2.2 2.2.1 Cochlea✓/organ of Corti (1)

2.2.2
- Oval window membrane will not vibrate✓
- No pressure waves will be set in the inner ear✓
- Impulse will not be generated✓
- Hearing will not take place✓/no sounds will be heard.

(Any 3) (3)

2.2.3
- Sudden change in the direction and speed of the head✓
- stimulates the cristae✓
- The change in the position of the head✓
- stimulates maculae✓
- Cristae and maculae converts the stimulus into an impulse✓
- which is sent through the the auditory nerve✓
- to the cerebellum✓.
- Cerebellum sends impulses to the skeletal muscles✓

(Any 6) (6)

(10)

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2.3 2.3.1 Thinking✓
Behavioural✓
Social✓ skills (2)
(Mark the FIRST TWO only)

2.3.2 65-69✓ (1)

2.3.3 The increase in age increases the incidence of the Alzheimer's disease✓✓.

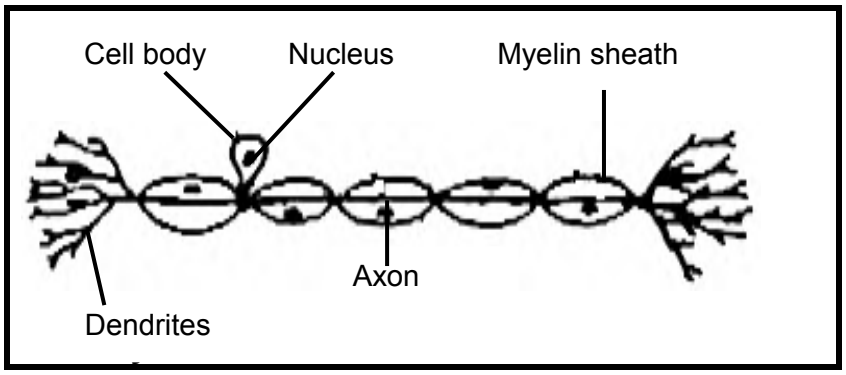
OR

Alzheimer's disease incidence increases as one gets older✓✓. (2)

2.3.4 Academic progress will be hindered✓
because basic subject matter will not be remembered✓ /poor thinking skills/poor participation skills/inability to focus

(Any) (2)

2.3.5



Criteria	Marks
Correct type of neuron	1
Any 3 correct labels	3

(4)
(11)

2.4
- Stimulates the conversion of glycogen into glucose✓
- increasing the glucose levels in the blood✓
- Breathing rate and depth of breathing increases✓
- increasing the oxygen levels in the blood✓.
- Heart beat increases✓
- more blood is sent to the heart, brain and skeletal muscles✓
- thus allowing the rate of cellular respiration to increase✓.

Any 4 **(4)**

[40]

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QUESTION 3

3.1 3.1.1 (a) Ovum✓/Egg cell (1)

(b) Luteinising✓ hormone/ LH (1)

(c) Implantation✓ (1)

3.1.2 Oestrogen✓ (1)

3.1.3 46✓ (1)

3.1.4 14✓

3.1.5
- Zygote✓ divides by mitosis✓
- to form a mass ball of cells✓
- called a morulla✓
- Which further divides by mitosis to form a hollow ball of cells
- called blastocyst✓/blastula. (Any 4) (4)

3.1.6
- FSH will not be produced✓
- No ovum will develop✓
- LH will not be produced✓
- therefore no ovulation will occur✓.
- No pregnancy will occur✓ (Any 4) (4)

3.1.7
- Fertilisation has taken place✓/woman has fallen pregnant
- Part F will continue producing progesterone✓
- to maintain the thickness of the endometrium✓
- and to inhibit FSH✓ (3)

(17)

3.2 3.2.1 (a) C✓ – pupil✓ (2)

(b) B✓ – lens✓ (2)

3.2.2 Accommodation✓ (1)

3.2.3 Light✓ (1)

3.2.4
- Radial muscles contracted✓
- Circular muscles relaxed✓
- Pupil size dilated✓
- More light entered the eye✓ (Any 3) (3)

3.2.5
- It is transparent✓
- to allow light to pass through✓
- It is curved✓
- to allow refraction✓ Any (2×2) (4)

(13)

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3.3 3.3.1 (a) Pituitary/hypophysis✓ (1)

(b) ADH✓/Antidiuretic hormone (1)

3.3.2 1✓ (1)

3.3.3
- High levels of ADH✓/ hormone **B** in the blood
- will increase permeability of the kidney tubules✓
- causing more water to be reabsorbed✓by osmosis
- resulting in an increase in water in the blood✓ (Any 3) (3)

3.3.4
- Low levels of ADH/hormone **B** in the blood✓/
- will cause the kidney tubules to be less permeable to water✓
- Less water will be reabsorbed into the blood✓
- More water will form part of the urine✓ leading to large volumes of urine. (Any 4) (4)

(10)
[40]

TOTAL SECTION B: 80

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SECTION C

QUESTION 4

Low insulin (I)
- Not all excess glucose in the liver/muscles ✓
- will be converted into glycogen✓
- glucose level will remain high✓
- resulting in diabetes mellitus✓. Max = 3

Thermoregulation (T)
- Hypothalamus is stimulated✓.
- which causes the blood vessels of the skin to dilate✓.
- More blood flows to the surface of the skin✓.
- More heat is lost through radiation✓.
- More blood flows to the sweat glands✓.
- and the sweat glands will produce more sweat✓.
- More heat is lost through evaporation of sweat✓.
- Body temperature decreases back to normal✓. Max = 6

Negative feedback (D)
During exercise
- Pituitary gland is stimulated✓
- to produce more TSH✓
- which stimulates the thyroid gland✓
- to secrete more thyroxin✓
- which increases cellular respiration✓
- to produce more energy✓ Max = 4

After exercise (A)
- Pituitary gland is stimulated✓
- by high levels of thyroxin in the blood✓
- to secrete less TSH into the blood✓
- TSH stimulates the thyroid gland✓
- to secrete less thyroxin✓
- cellular respiration decreases✓
- less energy is produced✓ Max = 4

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

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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
Only information about: - Low insulin - Thermoregulation - negative feedback of Thyroxin and TSH (during) - negative feedback of Thyroxin and TSH (after) No irrelevant information is given.	Information about: - Low insulin - Thermoregulation - negative feedback of Thyroxin and TSH (during) - negative feedback of Thyroxin and TSH (after)	- Low insulin 2/3 - Thermoregulation 5/6 - negative feedback of Thyroxin and TSH (during) 2/4 - negative feedback of Thyroxin and TSH (after) 2/4
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150

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