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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

CURRICULUM GRADE 10 -12 DIRECTORATE

NCS (CAPS) SUPPORT

LAST PUSH LEARNER REVISION DOCUMENT

LIFE SCIENCES: PAPER 1&2

GRADE 12

2024

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INTRODUCTION

Dear Grade 12 learner

The purpose of this document is to help you prepare for the end year examination by giving you revision tests for practice.

Remember the saying,*'Practice makes perfect*".

You must work through this document to improve your understanding,identify your areas of weakness and correct your own mistakes.

The document focuses on core content and skills of each knowledge area.It is divided into topics of both paper 1 and paper 2 with each revision test having a total of 50 marks.

PAPER 1 REVISION TESTS

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GRADE 12

LIFE SCIENCES

REVISION TESTS: REPRODUCTION 1

MARKS: 50

TIME: 60 Minutes

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4 D.

1.1.1 In an amniotic egg, the function of the allantois is to…

A produce oxygen for the growing embryo.
B acts as a shock absorber.
C provide food for developing embryo.
D store the waste for the developing embryo.

1.1.2 The following are some reproductive strategies in some fish species:

(i) Over 4 200 ova are released by a female.
(ii) Developing embryos are carried by a special structure in the male's mouth.
(iii) The male releases many sperm cells close to the ova.
(iv) The embryo is nourished by a yolk sac.

Which one of the following combinations increases the chances of fertilisation?

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

1.1.3 A gland that secretes fluid which nourishes a sperm cell is the…

A prostate gland.
B seminal vesicle.
C testes.
D Cowper's gland.

(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 Organelles found in large quantities in the neck region of a sperm cell.
1.2.2 The lower, narrow part of the uterus.
1.2.3 The site of female gametogenesis.
1.2.4 Type of development where the embryo is nourished by a placenta.

(4 x 1) **(4)**

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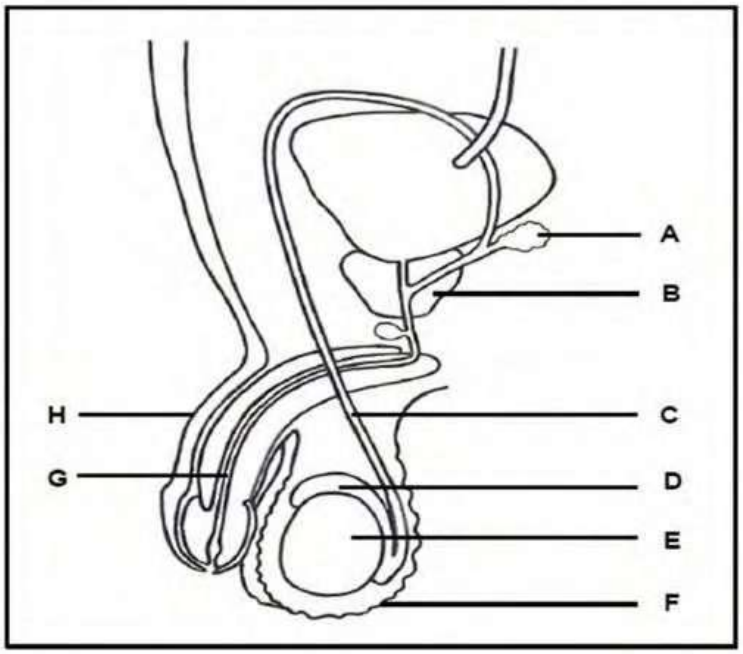
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.2) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Secondary sexual characteristics in males	A: Facial hair B: Broad shoulders
1.3.2	The part that transports semen out of the body	A: Scrotum B: Urethra

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

1.4 The diagram below represents part of the human male reproductive system.



1.4.1 Give the LETTER and NAME of the part:

(a) where sperm cells are produced. (2)

(b) which transport the sperm cells to the urethra (2)

1.4.2 State TWO functions of part **B**. (2)

(6)

TOTAL SECTION A: 20

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SECTION B

QUESTION 2

2.1 Read the extract below and answer the questions that follow.

The bluefin tuna, the great white shark and the bottlenose dolphin are three aquatic species that are found in the Indian Ocean.

An adult bluefin tuna releases up to 540 000 000 eggs into the water annually, while the great white shark female produces 2 to 12 offspring through ovovivipary every two years. A female bottlenose dolphin, being a mammal, is viviparous and produces one offspring every two to three years.

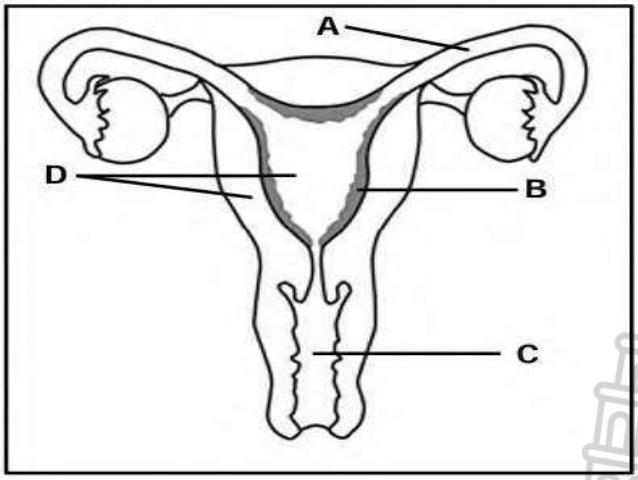
2.1.1 State the type of fertilisation in bluefin tuna. (1)

2.1.2 Explain how TWO of the reproductive strategies of the great white shark increases its reproductive success. (4)

2.1.3 Provide a reason why bluefin tuna produces many eggs. (1)

(6)

2.2 The diagram below represents the human female reproductive system



2.2.1 Identify part **B**. (1)

2.2.2 Explain ONE way in which part **D** is structurally suited for gestation. (2)

2.2.3 Describe the process that takes place in part **A** that leads to zygote formation. (2)

2.2.4 Draw a labelled diagram of a cell responsible for reproduction, present in the semen which is deposited in part **C**. (4)

(9)

[15]

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QUESTION 3

3.1 Describe the process of oogenesis. (4)

3.2 The table below shows a comparison of the composition of an amniotic egg of 3 bird species.

COMPOSITION	BIRD SPECIES		
	1	2	3
Yolk (%)	17	36	22
Water content in yolk (%)	77	57	61
Energy (kcal/g)	1,04	1,44	1,14

3.2.1 Which one of the following bird species **(1, 2 or 3)** probably shows altricial development strategy? (1)

3.2.2 Explain your answer in 3.1.1. (2)

3.2.3 Explain ONE way in which the shell is structurally suited for its function. (2)

3.2.4 Use the information in the table to draw a bar graph of yolk (%) composition in bird species. (6)

(11)

[15]

TOTAL SECTION B: 30

GRAND TOTAL: 50

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REVISION TEST: REPRODUCTION 2

MARKS: 50

TIME: 60 Minutes

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SECTION A

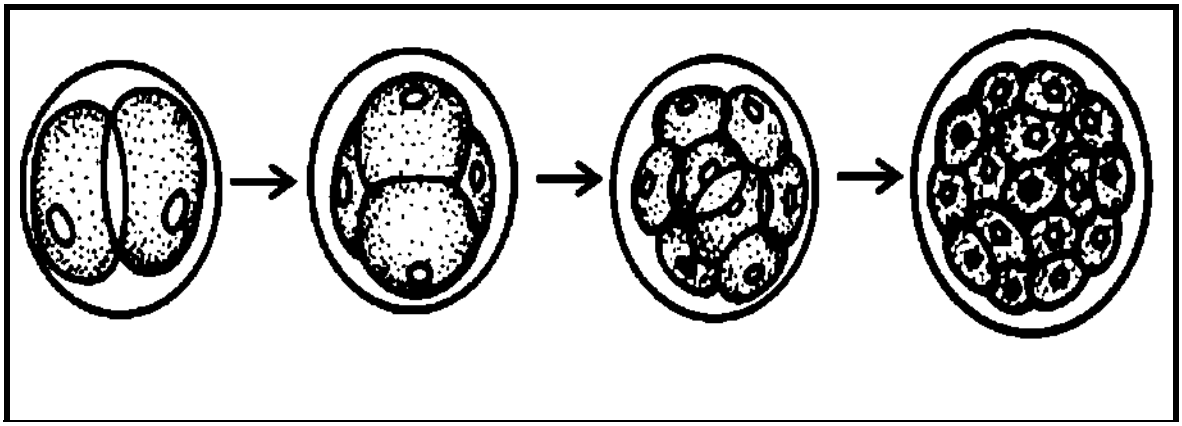
QUESTION 1

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 1.1.3 D.

1.1.1 The function of the umbilical vein is to transport ….

A carbon dioxide from the foetus to the mother
B nutrients from the foetus to the mother
C carbon dioxide from the mother to the foetus
D nutrients from the mother to the foetus

1.1.2 The diagram below represents events during human reproduction



In which part of the female reproductive system will the events shown in the diagram above occur?

A Fallopian tube
B Cervix
C Vagina
D Ovary

1.1.3. Which structures secrete progesterone during pregnancy?

A Adrenal gland and corpus luteum
B Corpus luteum and placenta
C Thyroid gland and graafian follicle
D Pituitary

(3 x 2) **(6)**

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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 1.2.4) in the ANSWER BOOK.

1.2.1 Structure that serves as a micro-filter during pregnancy

1.2.2 Attachment of the developing embryo to the uterine lining

1.2.3 The fluid surrounding the developing foetus in the uterus

1.2.4 The shedding of the endometrium and unfertilized ovum

(4 x 1) **(4)**

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 1.3.2) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1.	A process that produces four mature gametes in humans from a single diploid cell	A: B:	Oogenesis Spermatogenesis
1.3.2.	A hormone in humans that is produced in the reproductive system	A: B:	Oestrogen Testosterone

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

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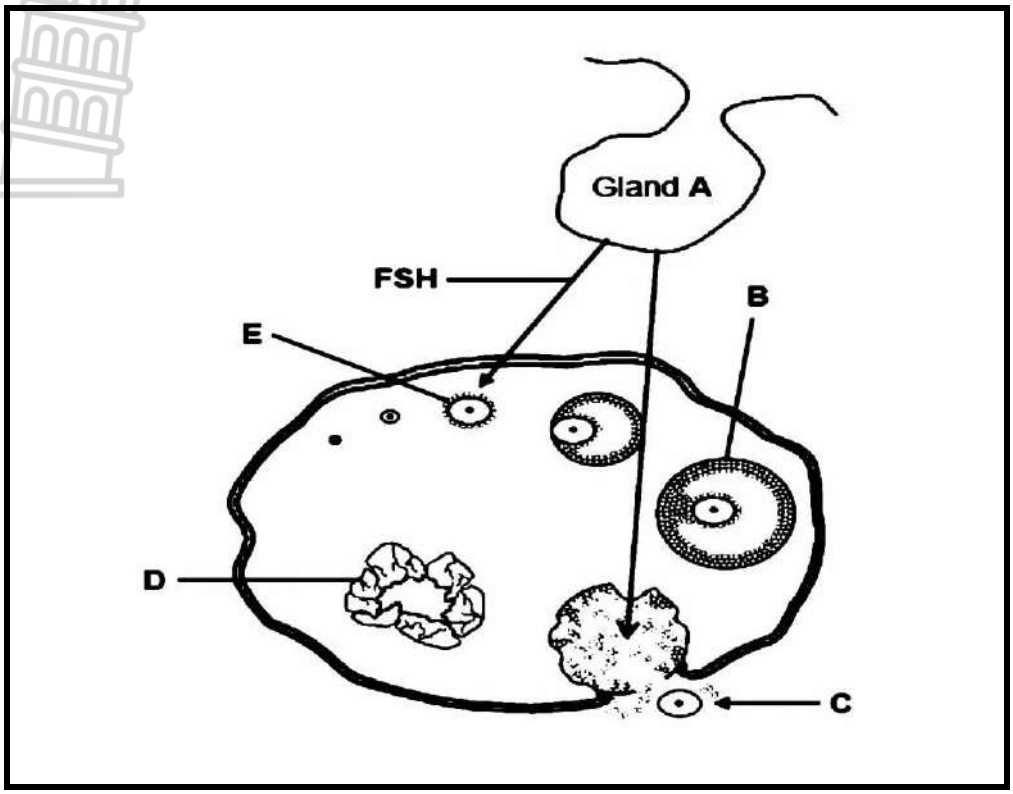
1.4 The diagram below represents an endocrine gland **A** and the events that take place in the ovary during the menstrual cycle in humans.



1.4.1 Identify:

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

(b) Structure **B** (1)

(c) Process **C** (1)

(d) Structure **D** (1)

1.4.2 State ONE function of LH (1)

1.4.3 State the effect on the oestrogen levels in the blood if gland **A** stops secreting FSH (1)

(6)

TOTAL SECTION A: 20

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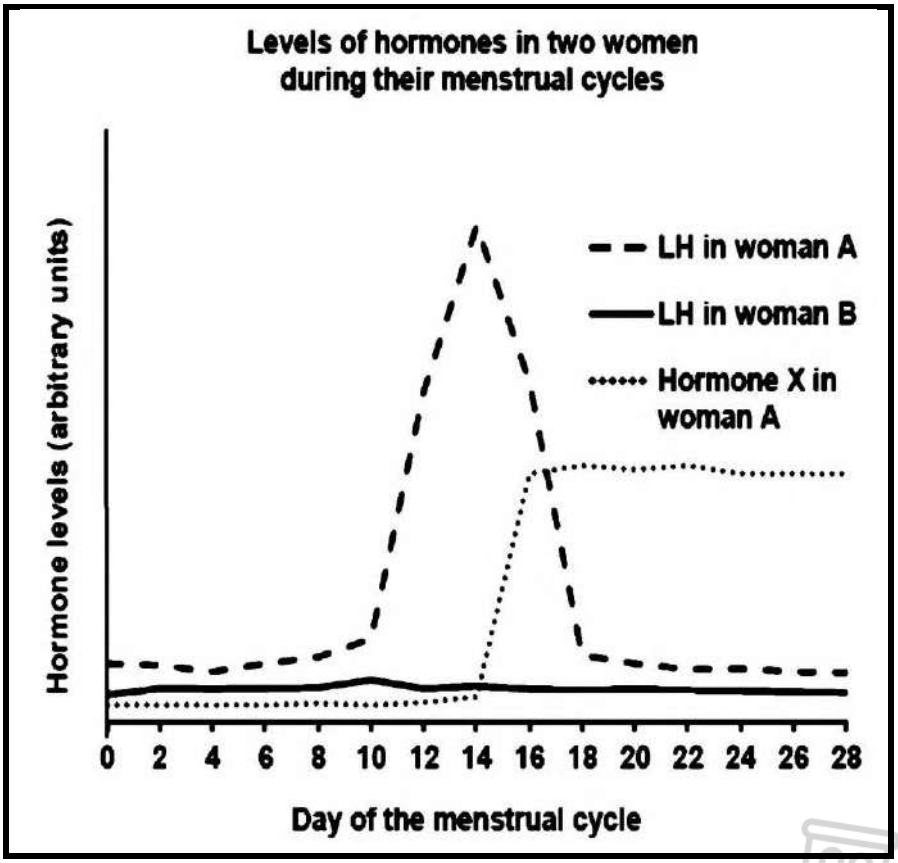
SECTION B

QUESTION 2

2.1 Sheehan's syndrome is a condition that results in females having very low levels of the luteinising hormone (LH).

The graph below shows the hormone levels of two different women during a 28-day menstrual cycle. Woman **A** has normal luteinising hormone (LH) levels while woman **B** suffers from Sheehan's syndrome.



2.1.1 State TWO functions of LH during the menstrual cycle (2)

2.1.2 Besides LH, name ONE other hormone that is secreted by the pituitary gland during the menstrual cycle. (1)

2.1.3 Give the name of hormone **X**. (1)

2.1.4 Use the information in the graph to explain how the level of hormone **X** will be different in woman **B**. (4)

2.1.5. What evidence in the graph suggests that woman **A** is pregnant? (1)

(9)

2.2 Describe the development of the placenta and the umbilical cord from the time of implantation (6)

[15]

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QUESTION 3

3.1. Premature delivery of babies (babies born between weeks 28 to 35 of gestation) has been a concern in many countries. The care of premature babies is very costly. Women with a history of premature delivery are sometimes given a progesterone treatment between weeks 16 to 20 of pregnancy.

However, this treatment is believed to lead to the development of gestational diabetes mellitus in the mother.

An investigation was done to determine if progesterone treatment leads to the development of gestational diabetes mellitus.
The procedure was as follows:

- 300 pregnant women with a history of premature delivery participated in the investigation (those that had pre-existing diabetes mellitus were excluded).
- The women were divided into two equal groups (Group **A** and Group **B**).
- The women in Group **A** were injected once a week with 250 mg of progesterone between weeks 16 and 20.
- Their glucose levels were measured and recorded daily between week 16 and 36 of the pregnancy.
- Group **B** was the control.

3.1.1. Identify the

(a) Independent variable (1)

(b) Dependent variable (1)

3.1.2. Why is the injection of progesterone a good treatment to prevent premature delivery? (2)

3.1.3. State TWO factors that were kept constant when the progesterone was administered in Group **A**. (2)

3.1.4. Describe how the investigators determined whether any of the participants in Group **A** had developed gestational diabetes mellitus. (2)

3.1.5 Group B was the control. (2)

Explain the importance of group **B** in this investigation.

(10)

3.2 Describe the secretion of the ovarian hormones and their role in the menstrual cycle (5)

[15]

TOTAL SECTION B: 30

GRAND TOTAL: 50

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TOPIC TEST: HUMAN RESPONSE TO THE ENVIRONMENT 1

MARKS: 50

TIME: 60 Minutes

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4 D.

1.1.1 The direction of the transmission of an impulse through a neuron is from the...

A cell body through the axon to the dendrites.
B dendrites through the cell body to the axon
C axon through the cell body to the dendrites
D dendrites through the axon to the cell body

1.1.2 The following is a list of components associated with the nervous system:

(i) Parasympathetic nervous system
(ii) Spinal nerves
(iii) Sympathetic nervous system
(iv) Cranial nerves

Which one of the following combination of components forms part of the peripheral nervous system?

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

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1.1.3 The table below shows the speed at which impulses are transmitted through different types of nerve fibres, A, B, C and D.

NERVE FIBRE	DIAMETER *(μm)*	AVERAGE SPEED OF TRANSMISSION (m/s)
A	15	100
B	7	19
C	3	13
D	1	1

Which ONE of the following is the best interpretation of the information in the table above?

A Nerve fibre A is found in patients suffering from multiple sclerosis.

B The speed of transmission of impulses is not important for the survival of an individual.

C The greater the diameter of the nerve fibre, the greater the speed of transmission

D Nerve fibre D is found in patients suffering from Alzheimer's disease.

(3 x 2) **(6)**

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 1.2.3) in the ANSWER BOOK.

1.2.1 Collective name for the membranes that protect the brain and spinal cord

1.2.2 A change in the internal or external environment that will be detected by a receptor and converted into an impulse

1.2.3 The nerve cells that make up nervous tissues

(3 x 1) **(3)**

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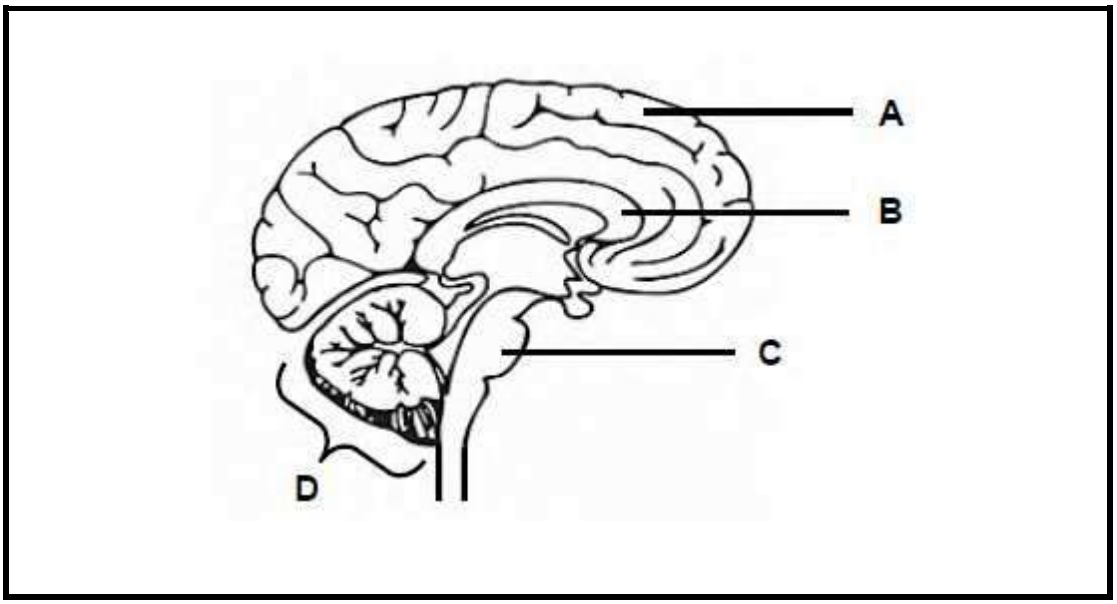
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.2) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The part of the brain that connects the left and the right hemispheres	A: Corpus luteum B: Corpus callosum
1.3.2	A structure in the nervous system that detects a stimulus	A: Effector B: Receptor

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

1.4 The diagram below represents parts of the central nervous system.



1.4.1 Name the TWO components of the central nervous system shown in the diagram (2)

1.4.2 Identify part **D**. (1)

1.4.3 Give the LETTER and NAME of the part that controls:

(a) the heartbeat (2)

(b) voluntary actions (2)

(7)

TOTAL SECTION A: 20

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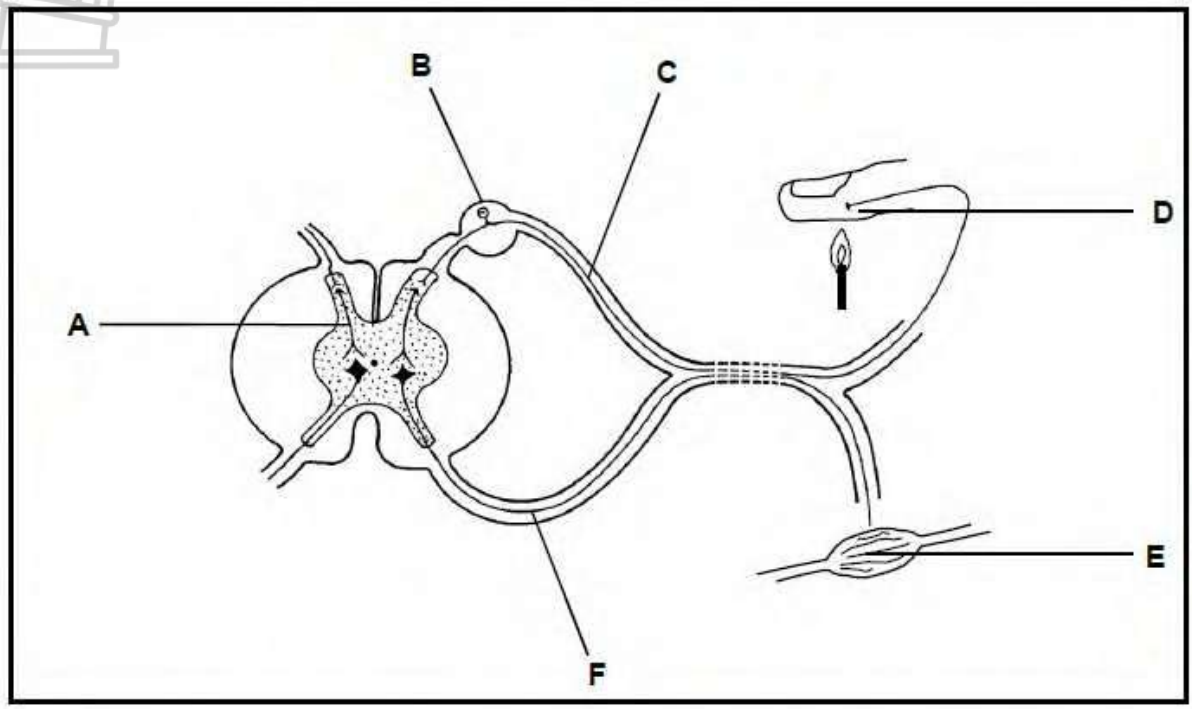
SECTION B

QUESTION 2

2.1 The diagram below shows a reflex arc.



2.1.1 Give ONLY the LETTER of the part that represents the:

(a) Effector (1)

(b) Interneuron / Connector neuron (1)

2.1.2 Draw the structure of the neuron that transmits impulses from receptors to the central nervous system. (4)
(6)

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2.2 The table below shows the recorded number of severe brain injuries per 100 000 people per year in different regions of the world.

REGIONS OF THE WORLD	NUMBER OF SEVERE BRAIN INJURIES (PER 100 000 PEOPLE PER YEAR)
Latin America	900
USA and Canada	1 300
East Mediterranean	890
Europe	1 010
Africa	800

2.2.1 Which region has the smallest number of severe brain injuries? (1)
2.2.2 Explain why this data may not be accurate for the region named in QUESTION 2.2.1. (2)
2.2.3 Draw a bar graph to represent the data in the table. (6)
(9)
[15]

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QUESTION 3

3.1 Read the extract below.

THE DIFFERENCE BETWEEN HYPOREFLEXIA AND HYPERREFLEXIA

Hyporeflexia is a condition where the skeletal muscles have a decreased reflex response. It is caused by damage to parts of a reflex arc. The damage is usually to the motor neurons, which send messages from the spinal cord to the skeletal muscles. This can be due to a medical condition called Guillain-Barré syndrome.

Hyperreflexia is the result of damage to the motor neurons that send messages from the brain to the spinal cord. People suffering from Multiple Sclerosis (MS) usually demonstrate Hyperreflexia and have loss of muscle control.

3.1.1 Define a reflex arc (1)

3.1.2 From the extract, state ONE:

(a) Medical condition that causes Hyporeflexia (1)

(b) Similarity in the causes of Hyporeflexia and Hyperreflexia (1)

(c) Symptom of Hyporeflexia (1)

3.1.3 Describe ONE difference between the causes of Hyporeflexia and Hyperreflexia. (2)

3.1.4 Name the part of a neuron that degenerates, leading to multiple sclerosis. (1)

3.1.5 Explain how damage to the part named in QUESTION 3.1.4 can lead to the symptoms of multiple sclerosis, as stated in the extract (3)

(11)

3.2 Describe the structure and functioning of the autonomic nervous system. (4)

[15]

TOTAL SECTION B: 30

GRAND TOTAL: 50

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REVISION TEST: HUMAN RECEPTORS (EYE AND EAR) 2

MARKS: 50

TIME: 60 Minutes

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4 D.

1.1.1 The part of the brain that receives impulses from the maculae…

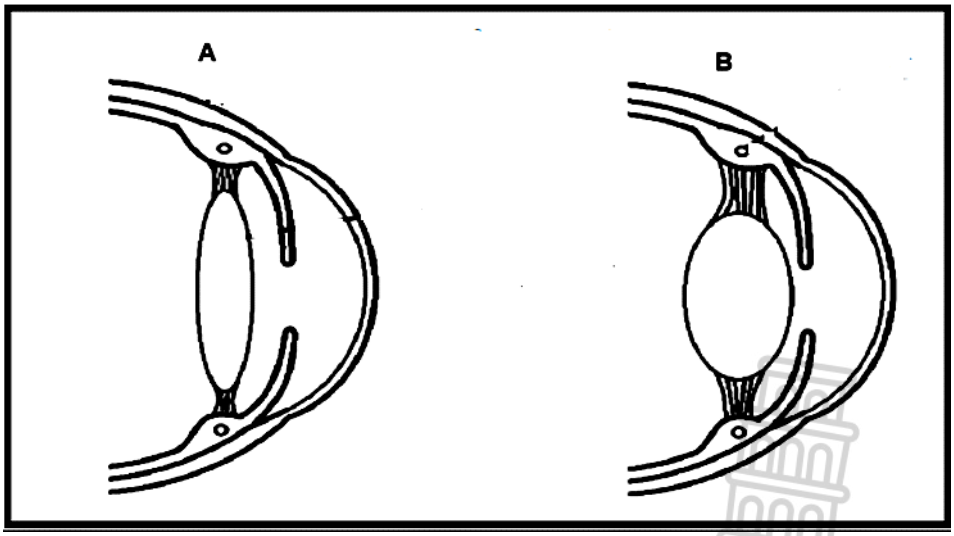
A cerebellum

B cerebrum

C hypothalamus

D corpus callosum

1.1.2 The following diagrams show two eyes focusing on an object at different distances.



Which ONE of the following will results in a change from **A to B?**

A a person looking up from reading a book

B a cricket player watching a ball coming towards him

C a child looking at the door after playing a game on her computer

D a mother watching her child riding a tricycle away from her

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1.1.3 Depth perception refers to the ability to judge distance.

An investigation was carried out to determine the effect of using one eye only or both eyes on depth perception.

Participants were asked to thread a needle as a test of depth perception. The number of attempts needed to successfully thread the needle was counted when using one eye only ad then when using both eyes.

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

Eyes used	Number of attempts
one eye only	12
both eyes	2

The results of this investigation show that…

A binocular vision decreases perception

B using one eye only increases depth perception

C the number of eyes used has no effect on depth perception

D binocular vision increases depth perception

(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 The series of changes that take place in the shape of the lens and the eyeball in response to the distance of an object from the eye

1.2.2 The receptor in the ear that detects changes in the direction and speed of any movement of the body

1.2.3 The type of vision where both eyes are used to focus on an object

1.2.4 A structure in the ear that contains receptors that convert pressure waves into nerve impulse in the ear

(4 x 1) **(4)**

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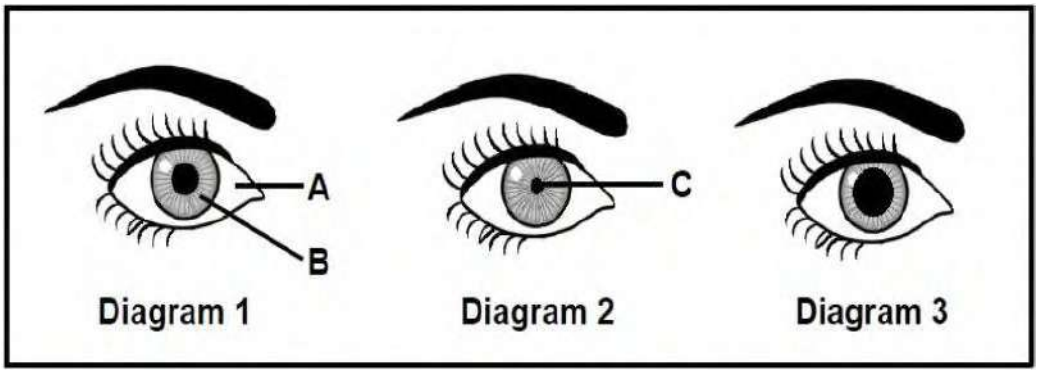
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **NONE next** to the question number (1.3.1 to 1.3.2) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	A structure in the ear that absorbs excess pressure waves from the cochlea	A: Pinna B: Auditory canal
1.3.2	A device that is responsible for the drainage of fluid from the middle ear	A: Grommets B: Hearing aids

(2X2) **(4)**

1.4 The diagrams below show the condition of the eyes for different light intensities when viewing the same object.



1.4.1 Give the LETTER ONLY of the part that:

(a) is made up of tough white fibrous tissue (1)

(b) contains muscles (1)

1.4.2 Which diagram (1, 2 or 3) represents the eye of a person:

(a) where the rods are stimulated the most (1)

(b) In a very bright area (1)

1.4.3 Which muscles are:

(a) contracted in diagram 2 (1)

(b) relaxed in diagram 3 (1)

(6)

TOTAL SECTION A: 20

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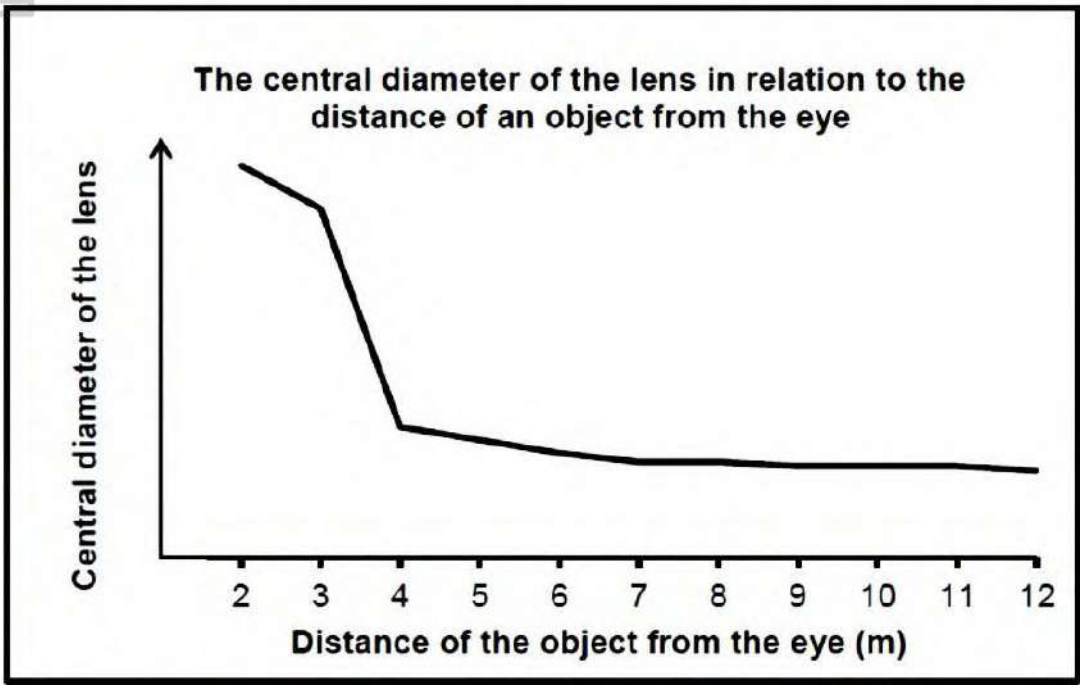
SECTION B

QUESTION 2

2.1 The following graph shows the change in the central diameter of the lens of the human eye while looking at an object at different distances from the eye.



2.1.1 Name the physical process that is illustrated by the graph. (1)

2.1.2 State ONE conclusion that can be drawn from the results in the graph. (2)

2.1.3 Explain THREE ways in which the lens is structurally suited to perform its function. (6)
(9)

2.2 Describe the changes that take place in the eye when a person looks up from reading a book to view an object that is further than 6 meters away from the eye. (6)
[15]

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QUESTION 3

3.1 Workers in some factories are constantly exposed to loud noise for long periods. This can destroy the hair cells in the organ of Corti and damage the auditory nerve, resulting in hearing loss.

A survey was conducted in a developing country from 2014 to 2018, to establish the number of factory workers who suffered from hearing loss.

The results are shown in the table below.

Year	Number of factory workers with hearing loss
2014	85 000
2015	100 000
2016	115 000
2017	120 000
2018	130 000

3.1.1 Name the structure in the ear where the organ of Corti is located. (1)

3.1.2 Calculate the percentage increase in the number of factory workers with hearing loss between 2014 and 2018. Show ALL workings. (3)

3.1.3 State THREE reasons for the increase in the number of factory workers with hearing loss caused by exposure to loud noise in this country. (3)

3.1.4 Explain why damage to the auditory nerve may result in hearing loss. (2)

(9)

3.2 Describe the role of the semi-circular canals in maintaining balance. (6)

[15]

SECTION B: 30

GRAND TOTAL: 50

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KWAZULU-NATAL PROVINCE
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NATIONAL

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GRADE 12

LIFE SCIENCES

REVISION TEST: PLANT RESPONSE TO THE ENVIRONMENT

MARKS: 50

TIME: 60 Minutes

N.B. This question paper consists of 8 pages including this page.

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INSTRUCTIONS AND INFORMATION

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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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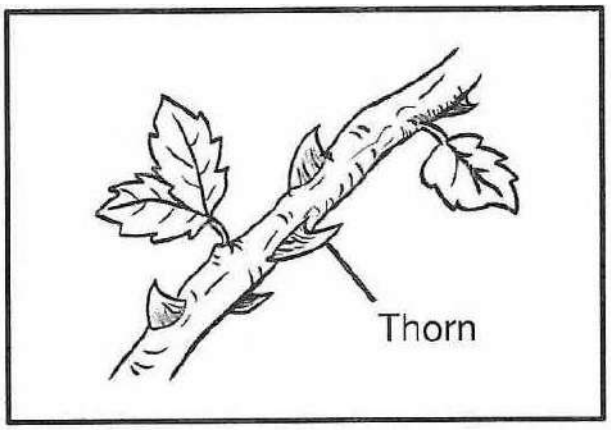
SECTION A

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 in your ANSWER BOOK, for example 1.1.3 D.

1.1.1 The diagram below shows a part of the stem of a plant.



Which ONE of the following is shown by the stem of this plant?

A Apical dominance
B Dormancy of lateral buds
C Plant defense mechanism
D Fruit develop

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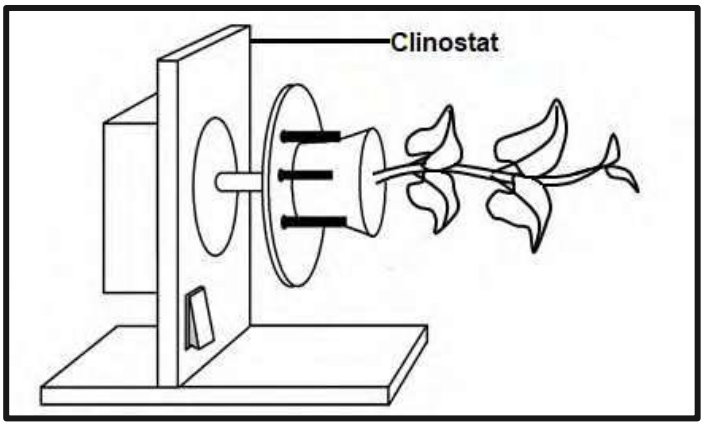
QUESTIONS 1.1.2 AND 1.1.3 REFER TO THE DIAGRAM BELOW THAT DIAGRAM BELOW SHOWS AN INVESTIGATION DONE TO DETERMINE THE EFFECT OF AUXINS ON TROPISM

The procedure was as follows:

- A pot plant was placed on a stationary clinostat.
- The plant was exposed to light from all directions.
- The growth was the observed after few days.

The diagram below shows the set-up of the investigation using clinostat



The results after a few days showed the stem growing upwards.

1.1.2 Which ONE of the following is an explanation of the results?

A Phototropism occurred because the auxins moved towards light, which inhibited growth on the lower side of the stem

B Geotropism occurred because the auxins moved downwards, which stimulated growth on the upper side of the stem.

C Phototropism occurred because the auxins moved away from light, which stimulated growth on the upper side of the stem.

D Geotropism occurred because the auxins moved upwards, which inhibited growth on the upper side of the stem.

1.1.3 A control for the same investigation was set up by putting an identical pot plant on a rotating clinostat.

Which ONE of the following would be the expected results observed after a few days?

A There will be no growth.

B The stem will grow upwards.

C The stem will grow downwards.

D The stem will grow horizontally.

(3X2) **(6)**

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1.2 Give the correct biological term for each og the following descriptions.

Write only the term next to the question number (1.2.1 -1.2.3) in the answer book

1.2.1 A plant hormone that inhibits the germination of seeds

1.2.2 The plant growth response towards gravity

1.2.3 The plant growth where auxins produced at the tip of the stem inhibit growth of the branches closer to the tip of the stem

(3×1) **(3)**

1.3 Indicate whether each of the description in COLUMN I apply 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 1.3.2) in the answer book

COLUMN I		COLUMN II
1.3.1	Plant hormone that promotes seed dormancy	A: Gibberellins B: Auxins
1.3.2	A defence mechanism that protects plants against herbivores.	A: Thorns B: Chemicals

(2×2) **(4)**

1.4 Read the extract below.

Some plants contain chemical substances such as alkaloids and cyanogenic glycosides which are toxic substances.

Caffeine is an example of an alkaloid that occurs in plants like Coffee Arabica (coffee), Camellia sinensis (tea) and Theobrona cacao (cocoa). Although harmless to humans, caffeine kills pathogenic fungi.

Nicotine is another example of an alkaloid that is found in the tobacco

plants.

1.4

1.4.1 From the extract , name:

(a) TWO alkaloids that are found in plants (2)

(b) THREE examples of beverages that contain caffeine (3)

1.4.2 State ONE characteristic of alkaloids and cyanogenic glycosides that make them effective as a plant defence mechanism (1)

1.4.3 Name ONE other plant defence mechanism (1)

(7)

TOTAL SECTION A 20

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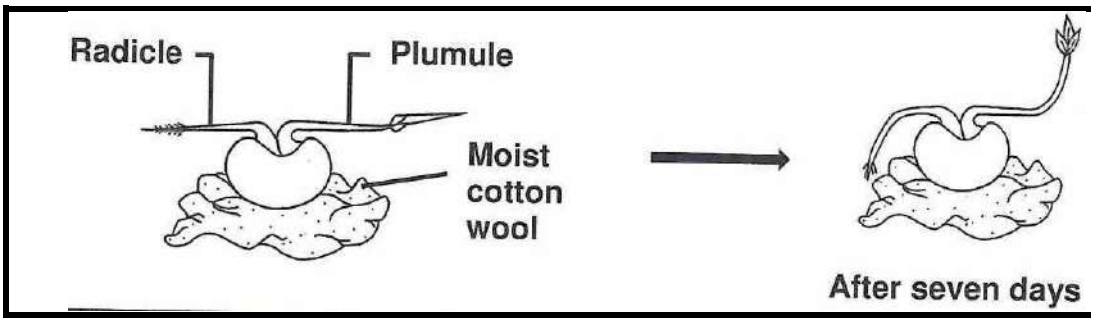
SECTION B

QUESTION 2

2.1 An experiment was set up to investigate a plant growth response to a stimulus

A seedling has a radicle (young root) and a plumule (young stem)

This seedling was placed horizontal in a dark place and a growth response was observed after seven days, as shown in the diagram below



2.1.1 Name the:

(a) Growth response observed after seven days (1)

(b) Plant hormone responsible for the growth response named in QUESTION 2.1.1 (a) (1)

2.1.2 Explain the growth response observed in the root of the seedling. (4)

2.1.3 Explain how a control set-up will be different from the above set-up. (2)

(8)

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2.2 The table below show the concentration of abscisic acid and gibberellins in germinating seeds over 10 days

TIME (DAYS)	HORMONE CONCENTRATION IN GERMINATING SEEDS (ARBITRARY UNITS)	
	ABSCISIC ACID	GIBBERELLINS
0	20	0
2	8	1
4	4	4
6	3	7
8	2	10
10	1	12

2.2.1 Draw a line graph to show the changes in the concentration of abscisic acid over period of the investigation. (6)

2.2.2 State what happened to the concentration of each of the following hormones over a period of the investigation:

(a) Abscisic acid (1)

(b) Gibberellins (1)

(8)

2.3 Explain the growth response of a plant when the stem is exposed to light coming from one side only (4)

20

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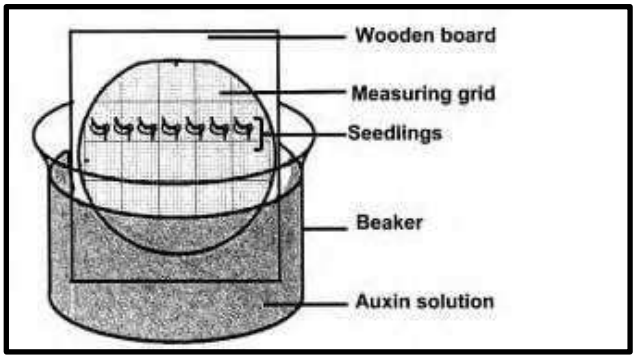
QUESTION 3

3.1 A group of Grade 12 learners investigated the influence of different concentration of auxins on plamule growth (A plumule is a young stem that grows from a seed)

The procedure was as follows:

- 35 bean seeds were germinated.
- The seedings were then divided into five groups of seven seedlings each.
- A measurement grid was first placed on a wooden board.
- In each group seven seedlings were tied to the wooden board with cotton thread.
- Each wooden board with seedings was placed in a beaker containing a different concentration of auxins.

The diagram below shows the set-up of a single beaker



BEAKER NUMBER	AUXIN CONCENTRATION IN PARTS PER MILLION (ppm)	AVERAGE INCREASED IN PLUMULE LENGTH (mm)
1	0.1	1.5
2	1	3.2
3	10	4.8
4	50	2.3
5	100	0

- All five beakers were placed inside a dark cupboard for three days
- After three days the increase in the length of each plumule (a young stem that grows from a seed) was measured.
- The average increase in the length of the plumule in each beaker was calculated and recorded in the table below

3.1 Identify the :

(a) Independent variable (1)

(b) Dependent variable (1)

3.2 State the purpose of the grid that was placed on a wooden board. (1)

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3.3 State ONE way in which the learners ensured the reliability of this investigation. (1)

3.4 State THREE factors, not stated in the procedure, that should be kept constant during this investigation (3)

3.5 State the conclusion for this investigation (2)

3.6 Name ONE other plant hormone that influence plant growth. (1)

[10]

SECTION B: TOTAL: 30

GRAND TOTAL : 50

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KWAZULU-NATAL PROVINCE
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GRADE 12

LIFE SCIENCES

REVISION TEST: ENDOCRINE SYSTEM & HOMEOSTASIS

MARKS: 50

TIME: 60 Minutes

N.B. This question paper consists of 6 pages including this page.

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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 1.1.3) in your ANSWER BOOK, for example 1.1.5 D.

1.1.1 Diabetes mellitus is caused by an …

A oversecretion of glucagon
B undersecretion of glucagon
C oversecretion of insulin
D undersecretion of insulin

1.1.2 An over-secretion of the hormone produced by the thyroid gland may result in a person …

A gaining weight, because of an increased metabolic rate
B gaining weight, because of a decreased metabolic rate
C losing weight, because of an increased metabolic rate
D losing weight, because of a decreased metabolic rate

1.1.3 Which ONE of the following is CORRECT regarding the homeostatic control of the carbon dioxide concentration in the blood?

A The lungs have receptors
B High oxygen levels is the stimulus
C Breathing muscles are the effectors
D The process is controlled by the cerebrum

(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 Group of cells in the pancreas that secrete insulin and glucagon
1.2.2 The hormone that is responsible for osmoregulation in the body
1.2.3 A hormone that prepares the body for emergency
1.2.4 The form in which excess glucose is stored in the liver

(4 x1) **(4)**

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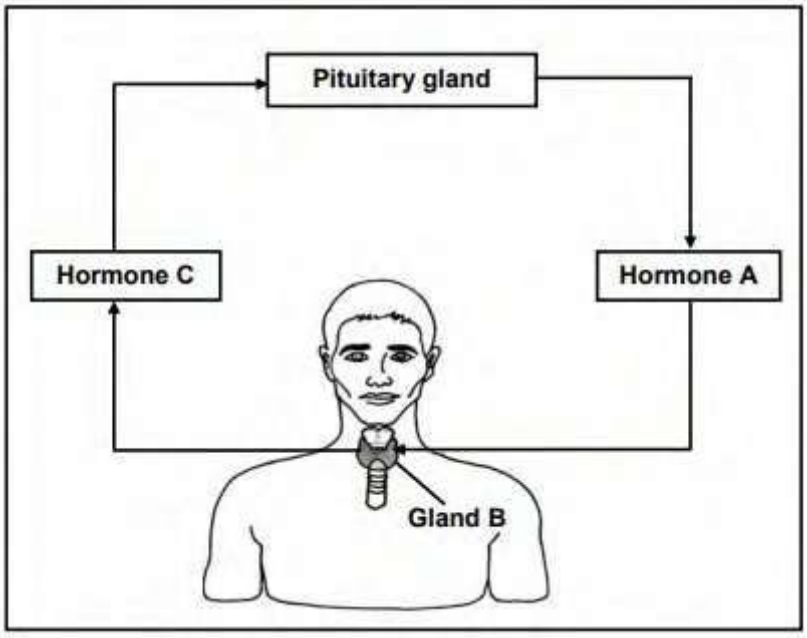
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.2) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Hormone secreted by the pituitary gland	A: Prolactin B: Growth hormone
1.3.2	The state of the blood vessels in the skin of a human when the environmental temperature is high	A: Dilated B: Constricted

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

1.4 The diagram below shows the interaction between two endocrine glands.



1.4.1 Name the type of interaction that occurs between hormone **A** and gland **B**. (1)

1.4.2 Identify:

(a) Gland **B** (1)

(b) Hormone **A** (1)

(c) Hormone **C** (1)

1.4.3 Name the disorder that results when gland **B** is overstimulated and becomes enlarged. (1)

1.4.4 Which hormone (**A** or **C**) will be expected to be high in the blood of the person with the disorder named in QUESTION 1.4.3? (1)

(6)

TOTAL SECTION A: 20

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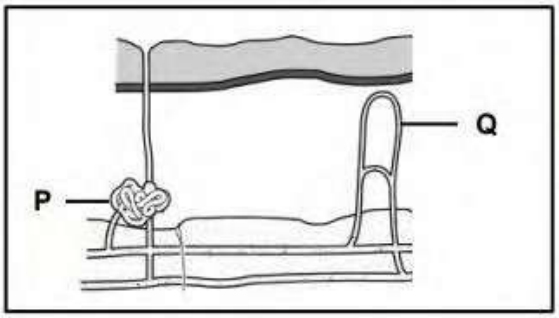
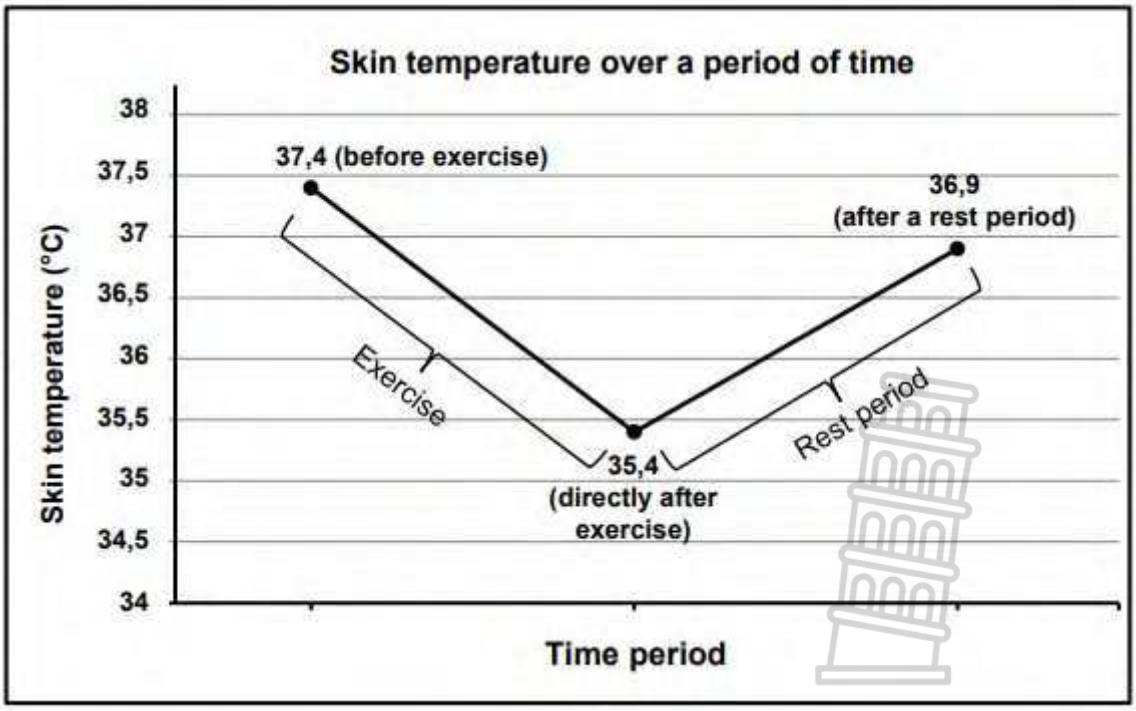
SECTION B

QUESTION 2

2. A twelve-year-old boy participated in physical exercise for 45 minutes, followed by a 15-minute rest period. The skin temperature of the boy was measured and the results were recorded.
The diagram below represents the skin of the boy before exercise.



The graph below shows the changes in skin temperature over a period of time.



2.1 Name the:

(a) Homeostatic mechanism that brings about the change in skin temperature. (1)

(b) Part of the brain that is responsible for the mechanism named in QUESTION 2.1(a) (1)

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2.2 From the diagram, identify the following parts:

(a) **P** (1)

(b) **Q** (1)

2.3 Calculate the percentage decrease in the average skin temperature of the boy before and directly after exercise. Show ALL working. (3)

2.4 Explain the roles of part P and Q in the change in skin temperature from before exercise to directly after exercise. (6)

2.5 Explain why temperature needs to be kept constant in a human body? (2)

(15)

QUESTION 3

3 Hyperaldosteronism is a disorder caused by the over-secretion of aldosterone and has been linked to high blood pressure in humans.
Scientists investigated the influence of increased aldosterone levels on blood pressure.
The procedure was done as follows:

- 1 688 healthy volunteers, aged 55, participated in the investigation.
- The participants' blood pressure was measured and recorded before the start of the investigation.
- The participants were injected with a dose of aldosterone in the morning and their blood pressure was measured every hour for 12 hours.
- This procedure was followed over four days for each individual and the average blood pressure was calculated.

All participants followed the same diet during the period of the investigation

3.1 Name the gland that secretes aldosterone. (1)

3.2 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.3 Give TWO reasons why the results of this investigation may be considered reliable. (2)

3.4 Explain TWO reasons why it was important for the participants to follow the same diet during the investigation. (4)

3.5 Explain why the participants' blood pressure was measured before the start of the investigation. (2)

3.6 Explain why the level of salt in the urine of participants is expected to decrease after being injected with aldosterone. (3)

3.7 State ONE factor that was kept constant during this investigation (1)

(15)

SECTION B: 30

GRAND TOTAL: 50

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GRADE 12

LIFE SCIENCES

REVISION TEST: DNA CODE OF LIFE

MARKS: 50

TIME: 60 Minutes

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4 D.

1.1.1 A segment of DNA contains:

- 31% of adenine in strand 1
- 12% of cytosine in strand 2
- 27% of guanine in strand 2

In this segment of DNA, there will also be …

A 31% of adenine in strand 2

B 12% of cytosine in strand 1

C 31% of thymine in strand 2

D 27% of cytosine in strand 2

1.1.2 The insulin molecule contains 51 amino acids.

How many mRNA nucleotides code for this insulin molecule?

A 51

B 17

C 153

D 152

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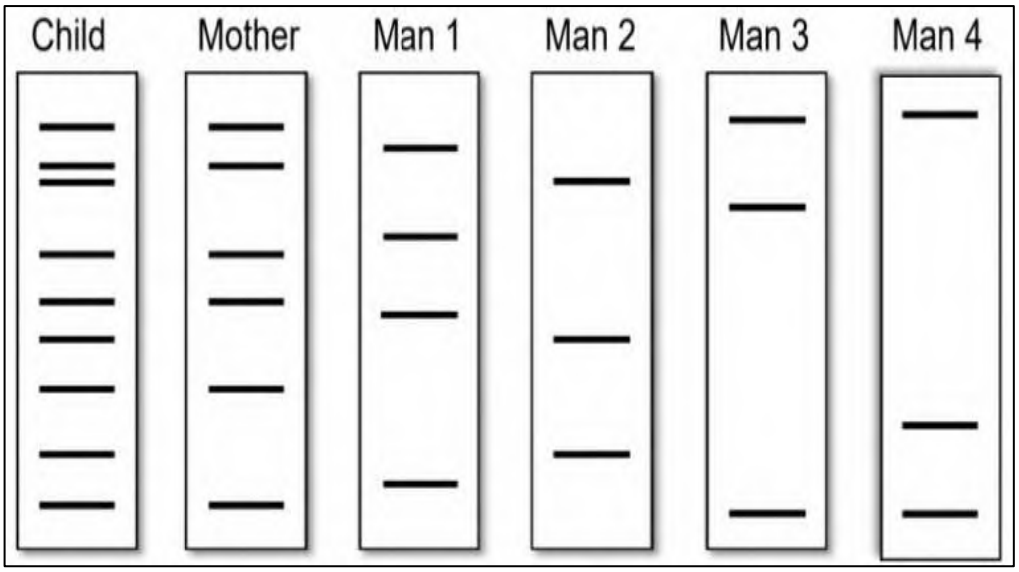
1.1.3 There is uncertainty about who the biological father of the child is. To establish paternity, DNA profiling was conducted.

The diagram below shows the DNA profiles of a child, her mother and four men.



Which one of the following men is most likely to have been the father of the child?

A Man 1

B Man 2

C Man 3

D Man 4

(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 The analysis of DNA samples to identify individuals that may be related

1.2.2 The natural shape of the DNA molecule

1.2.3 A sudden change in the nucleotide sequence of a DNA molecule

1.2.4 The type of bond between amino acids

(4 x 1) **(4)**

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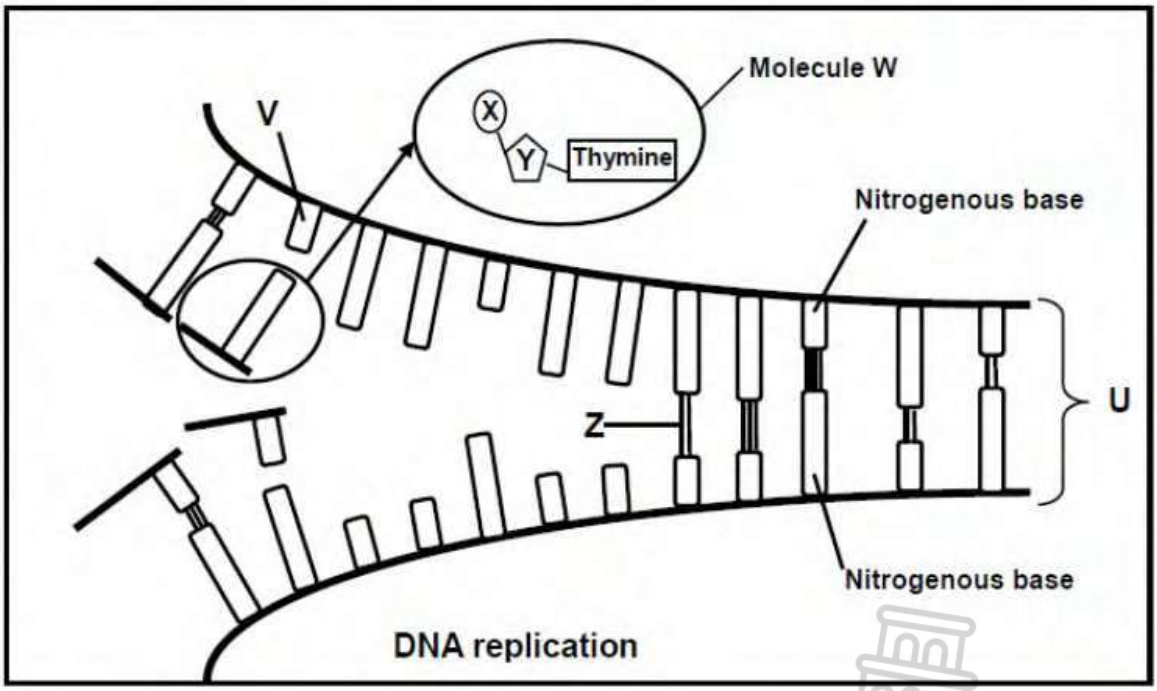
1.3 Indicate whether each of the descriptions in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number (1.3.1 to 1.3.2) in the ANSWER BOOK.

	COLUMN I		COLUMN II		
1.3.1	The importance of DNA replication	A: B:	Doubles genetic material Formation of mRNA		
1.3.2	Discovered the structure of DNA molecule	A: B:	James Watson Francis Crick		
			(2 x 2)		**(4)**

1.4 The diagram below represent DNA replication



1.4.1 Identify the following:

(a) Molecules **W** and **U** (2)

(b) Parts of molecules W labelled **X** and **Y** (2)

(c) Bond **Z** (1)

1.4.2 Name the phase of the cell cycle during which replication takes place. (1)

(6)

TOTAL SECTION A: 20

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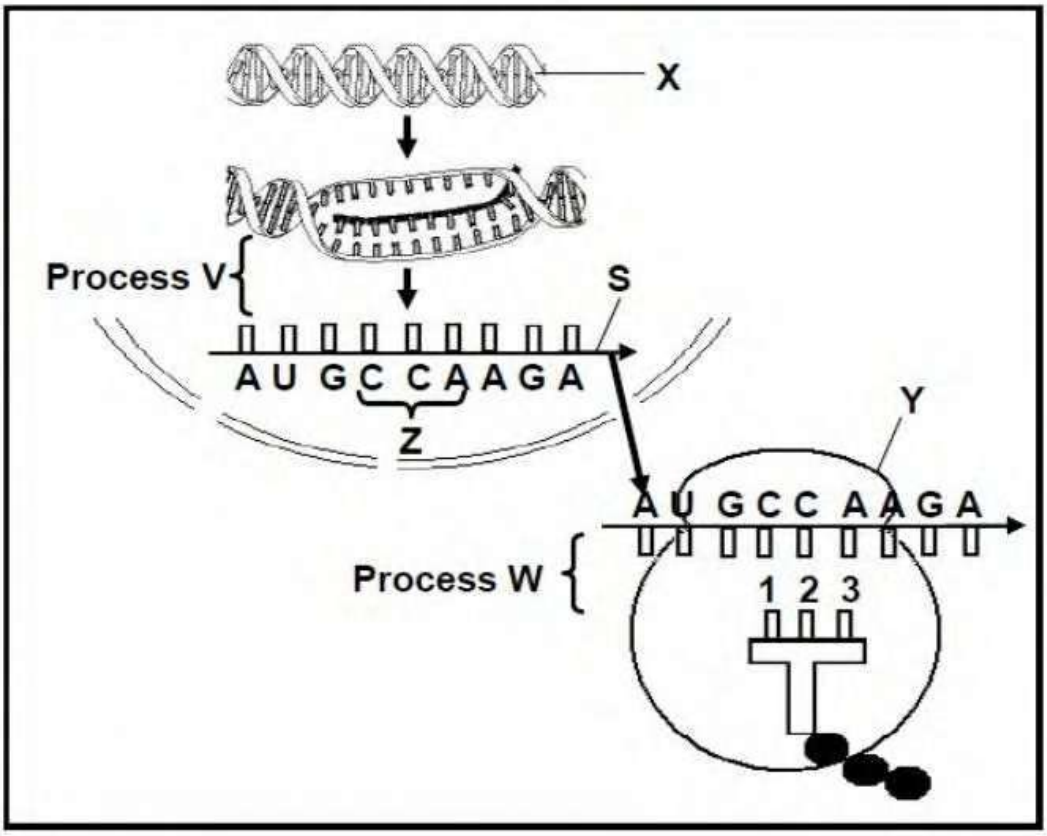
SECTION B

QUESTION 2

2. The diagram below represent the process of protein synthesis



2.1 Identify the following:
(a) Molecule **X** (1)
(b) Organelle **Y** (1)
(c) Nitrogenous base **1** (1)

2.2 Describe the **role** of DNA during transcription. (3)

2.3 Tabulate ONE structural difference between molecule **X** and molecule **S**. (3)

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2.4 The table below shows the amino acids that correspond with different DNA codes

AMINO ACID	DNA CODE
Arginine	TCT
Methionine	TAC
Glycine	GGT
Arginine	TCG

Write down the correct sequence of amino acids coded for by structure **S** in the diagram. (3)

2.5 If the 9th base on molecule **S** was changed to **C**, explain the consequence to the protein formed. (3)

(15)

QUESTION 3

3 DNA samples from a patient with an illness showed that there were two different types of DNA present.

One was from a human and the other was from a virus. The two types of DNA were isolated and put into different test tubes. The analysis of the nitrogenous base composition of each type of DNA is shown in the table below.

Type of DNA	Nitrogenous base composition (%)			
	Adenine	Cytosine	Guanine	Thymine
Type 1	22.1	27.9	27.9	22.1
Type 2	31.1	31.3	18.7	18.9

3.1 Identify the independent variable. (1)

3.2 Draw a bar graph that compares the composition of nitrogenous bases of Type 2 DNA. (6)

3.3 List TWO ways to improve the reliability of this investigation. (2)

3.4 State TWO ways in which the validity of the investigation can be ensured. (2)

3.5 Provide evidence for the identification of Type 1 DNA as being that of a human. (2)

3.6 State TWO objections that people may have against keeping a DNA database of all citizens in the country. (2)

(15)

TOTAL SECTION B: 30

GRAND TOTAL: 50

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NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES

REVISION TEST: MEIOSIS

MARKS: 50

TIME: 60 Minutes

N. B. This question paper consists of 7 pages including this page.

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4.A

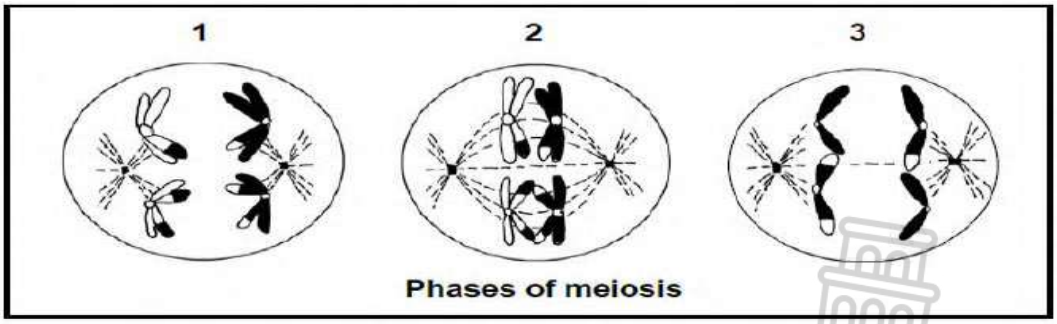
1.1.1 When a cell divides by meiosis it results in …

A four haploid gametes.
B two diploid gametes.
C four haploid somatic cells.
D two haploid somatic cells.

1.1.2 Homologous chromosomes are described as…

A being similar in structure and coding for the same characteristics.
B a product of the division of chromosomes.
C identical daughter chromatids formed through DNA replication.
D two chromosomes that code for different characteristics.

1.1.3 The diagrams below represent different phases of meiosis.



The correct order of the phases is…

A 1, 2 and 3
B 2, 3 and 1
C 3 ,1 and 2
D 2,1 and 3

(3 x 2) **(6)**

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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 1.2.4) in the ANSWER BOOK.

1.2.1 The division of the cytoplasm of a cell during cell division

1.2.2 The structure in animal cells that gives rise to spindle fibres during cell division.

1.2.3 The structure that joins two chromatids together

1.2.4 A segment of a chromosome that codes for a particular characteristic

(4 x 1) **(4)**

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 1.3.2) in the ANSWER BOOK.

COLUMN I	COLUMN II	
1.3.1 DNA replication occurs in this phase	A: B:	Metaphase I Metaphase II
1.3.2 Contributes to formation of haploid cells	A: B:	Mitosis Meiosis

(2X2) **(4)**

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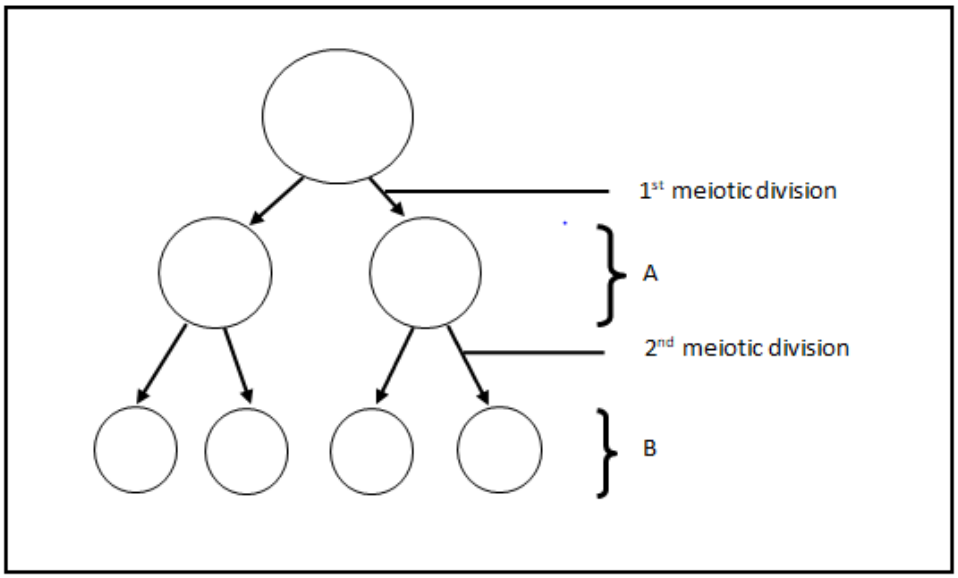
1.4 The diagram below shows the process of meiosis occurring in human males.



1.4.1 Name the type of gametogenesis represented in the diagram above. (1)

1.4.2 Identify the phase represented by **A** (1)

1.4.3 Give the type of gametes produced by the process in QUESTION 1.4.1. (1)

1.4.4 State the hormone responsible for the process mentioned in above. (1)

1.4.5 How many chromosomes will be found in each cell at:

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

(6)
[10]

TOTAL SECTION A: 20

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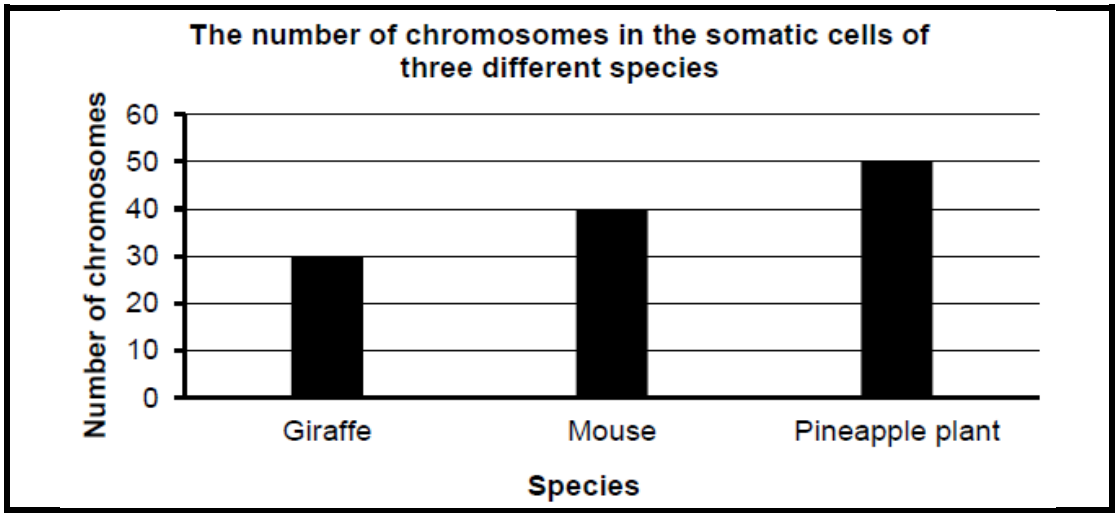
SECTION B

QUESTION 2

2.1 The number of chromosomes in the somatic cells of organisms differs from species to species.
The graph below shows the number of chromosomes in each somatic cell of THREE different species.



2.1.1 How many chromosomes will be present in :

(a) Giraffe cells during Metaphase II of meiosis. (1)

(b) A leaf cell in pineapple plant. (1)

2.1.2 If a mouse's somatic cell has 40 chromosomes, calculate the number of chromatids in the same somatic cell. Show all your working. (2)

2.1.3 State ONE way in which meiosis contributes to genetic variation. (1)

(5)

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2.2 The table below shows the relationship between the age of a mother and the risk of having a baby with Down syndrome.

.

Age of mother (years)	Risk of Down syndrome baby (per 10 000 births)
25	8
35	25
45	200

2.2.1 State the relationship between the mother's age and the chance of having a baby with Down syndrome (2)

2.2.2 By how many times does the risk of having a baby with Down syndrome increase between the age of 25 to 35 (1)

2.2.3 Draw a pie chart to represent the information on the table (6)

2.2.4 Name ONE organ in human females where meiosis occurs. (1)

(10)

[15]

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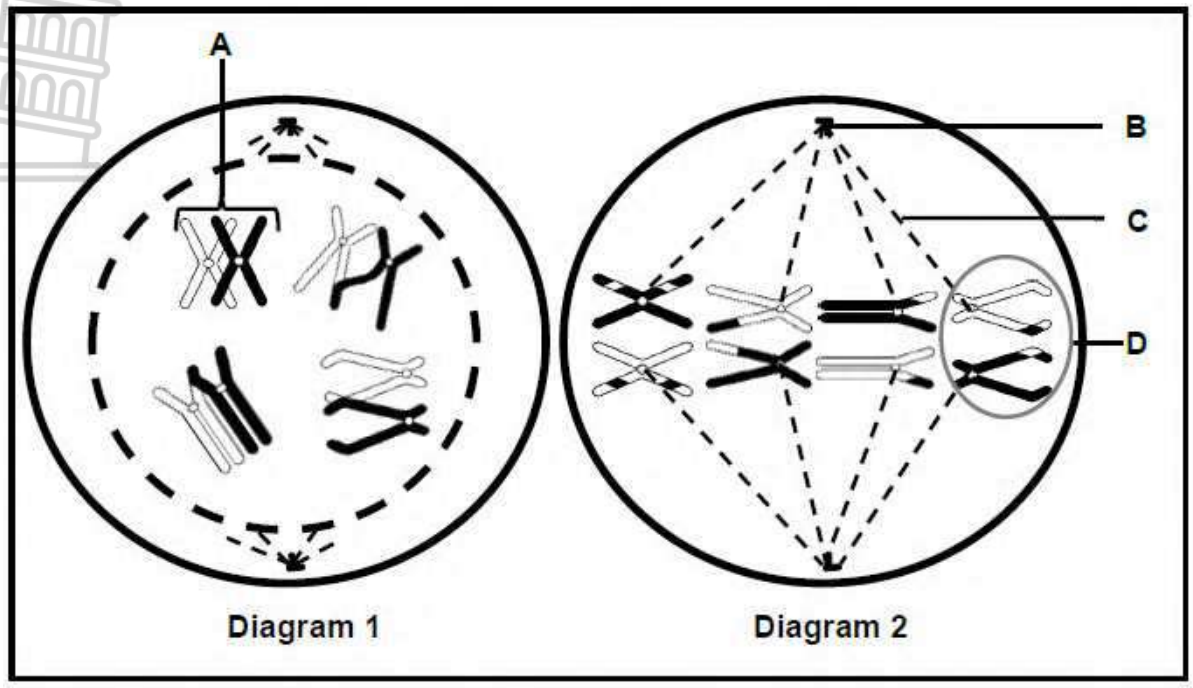
QUESTION 3

3.1 The diagrams below represent two stages of meiotic cell division.



3.1	Identify the phase represented by DIAGRAM 2	(1)
3.2	Give TWO reasons for your answer in QUESTION 3.1.	(2)
3.3	State ONE function of each structure:	
	(i) B	(1)
	(ii) C	(1)
3.4	Name and describe the significance of the process taking place at **A** in humans	(3)
3.5	Tabulate TWO differences between meiosis I and meiosis II	(5)
3.6	Explain why the cells in the diagrams above do not represent human cell.	(2)
		[15]

TOTAL SECTION B: 30

GRAND TOTAL : 50

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GRADE 12

LIFE SCIENCES
REVISION TEST
GENETICS AND INHERITANCE: 1

MARKS: 50

TIME: 60 Minutes

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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 1.1.3) in your ANSWER BOOK, for example 1.1.4 D.

1.1.1 The inheritance of one trait does not depend on the inheritance of another trait. This represents …

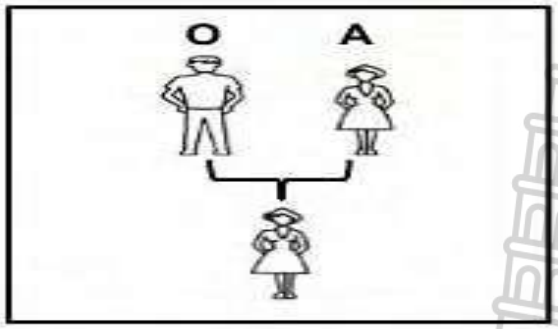
A Mendel's law of dominance.
B the law of codominance
C the principle of variation
D Mendel's principle of independent assortment.

1.1.2 In mice, the genotype yy produces grey fur and Yy produces yellow fur. The genotype YY results in death during the early embryonic stages.

A yellow female mouse is mated with a yellow male mouse. Which of the following shows the correct ratio of yellow to grey offspring that could be born alive?

A 1 : 1
B 1 : 3
C 2 : 1
D 3 : 1

1.1.3 The diagram below shows the blood types of two parents.



The only possible blood type(s) of the offspring of the first generation (F1) is/are …

A AB and O
B A and O
C A only
D A and B

(3 x 2) **(6)**

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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 1.2.4) in the ANSWER BOOK.

1.2.1 The type of inheritance where the dominant allele masks the expression of the recessive allele in the heterozygous condition

1.2.2 Two or more alternative forms of a gene at the same locus

1.2.3 Characteristics controlled by genes which are located on the sex chromosomes

1.2.4 A genetic cross involving two different characteristics

(4 x 1) **(4)**

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 1.3.2) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	All the genes in all the chromosomes of a species	A: Genome B: Genotype
1.3.2	A plant with white flowers that is crossed with a plant with red flowers and produces offspring with pink flowers	A: Complete Dominance B: Incomplete dominance

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

1.4 In rabbits, black fur is produced by the allele **(B)** and white fur by the allele **(b).**

The table below shows the genotypes of some rabbits.

RABBIT	GENOTYPE
1	BB
2	Bb
3	bb

1.4.1 Give the phenotype:
(a) Produced by the recessive alleles (1)
(b) Of rabbit 2 (1)

1.4.2 Give the NUMBER only (**1**, **2** or **3**) of the rabbit(s) that is/are:
(a) Pure-bred (2)
(b) Homozygous dominant (1)
(c) Will ONLY produce offspring that are black when crossed with any other rabbit. (1)
(6)

TOTAL SECTION A: 20

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SECTION B

QUESTION 2

2.1 Flower colour (purple or white) in a particular plant species is controlled by two alleles, D and d.

Four crosses were carried out to determine which allele is dominant. Forty (40) offspring were produced in each cross. The phenotypes of the parents and offspring in each cross were recorded.

The results are shown in the table below.

CROSS	PHENOTYPE		
	PARENT 1	PARENT 2	OFFSPRING
1	purple	white	40 purple
2	purple	purple	31 purple, 9 white
3	white	white	40 white
4	purple	white	21 purple, 19 white

2.1.1 State the dominant flower colour. (1)

2.1.2 Explain your answer to QUESTION 2.1.1 using cross **1** (2)

2.1.3 State Mendel's Law of Segregation. (3)

2.1.4 Use a genetic cross to show how the crossing of two purple flowering plants can produce white offspring, as in cross 2. (6)

(12)

2.2 Haemophilia is a sex-linked blood-clotting genetic disorder caused by a recessive allele on the X- chromosome. A male with genotype X^hY suffers from haemophilia, but one with genotype X^HY does not have this disorder.

Explain why ONLY females can be carriers of haemophilia. (3)

(3)

(15)

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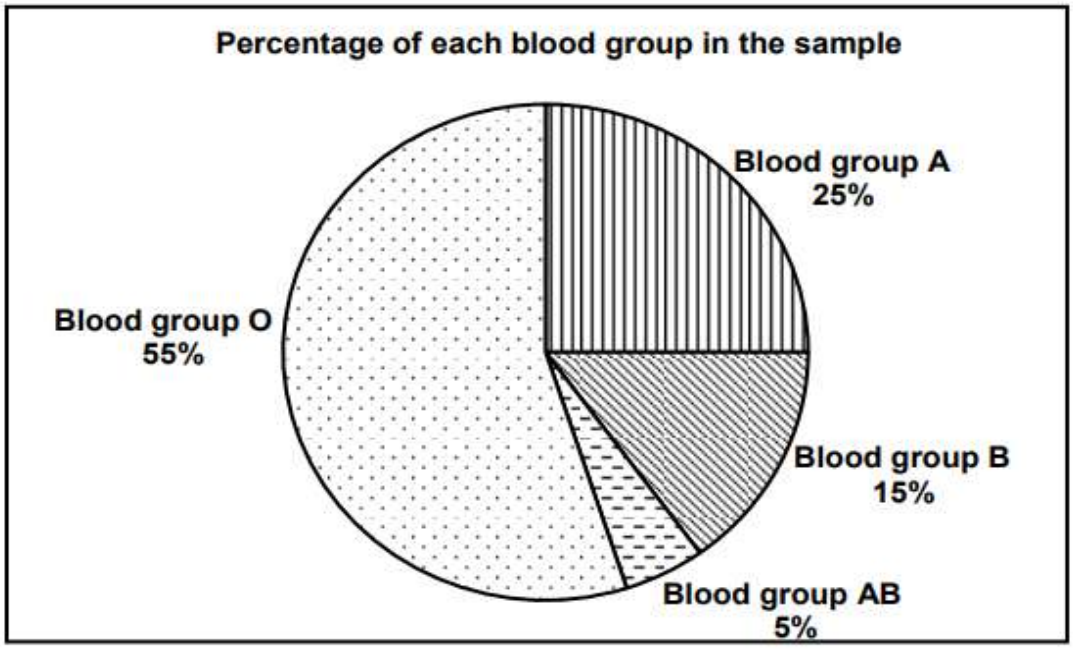
QUESTION 3

3 Learners conducted an investigation to determine which blood group was the most common in their community.

They collected information about the blood groups of 200 blood donors in each of the three blood donor clinics in their community. They did not include first-time donors in the investigation.

The pie chart below shows the results of the investigation.



3.1 State the aim of the investigation. (2)

3.2 State:

(a) THREE planning steps to consider when conducting this investigation. (3)

(b) TWO ways in which learners ensured the reliability of the results. (2)

(c) ONE reason why they did not include first time donors. (1)

3.3 Calculate the number of participants that had blood group **B**. Show ALL your working. (3)

3.4 Name the blood group which:

(a) has only recessive alleles in the genotype (1)

(b) is a result of co-dominance (1)

3.5 Give ALL the possible genotypes of blood group represented by 25% of the donors. (2)

(15)

TOTAL SECTION B: 30

GRAND TOTAL: 50

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LIFE SCIENCES
REVISION TEST: GENETICS & INHERITANCE (2)

MARKS: 50

TIME: 60 Minutes

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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 1.1.3 D.

1.1.1 The chances of having a female child in humans is …

A 25 %
B 50 %
C 75 %
D 100 %

1.1.2 Which ONE of the following is the genotype of a person with haemophillia?

A X^HX^h
B X^HY
C X^HX^H
D X^hY

1.1.3 The statements below describe the steps in the process of cloning an animal.

(i) The embryo is implanted into the uterus of an adult female for development.
(ii) The nucleus from a somatic cell of the donor is extracted.
(iii) The nucleus from the somatic cell is inserted into the ovum
(iv) The nucleus from the ovum of another individual is removed.
(v) The ovum with the new nucleus is given an electric shock to stimulate cell division and the formation of the embryo.

Which combination shows the CORRECT order of the steps?

A (ii)→ (iv)→ (iii)→ (v)→ (i)
B (ii)→ (iii)→ (iv)→ (v)→ (i)
C (i)→ (ii)→ (iii)→ (iv)→ (v)
D (ii)→ (iv)→ (v)→ (iii)→ (i)

(3 x 2) **(6)**

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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 1.2.4) in the ANSWER BOOK.

1.2.1 Characteristics controlled by genes which are located on the sex chromosome

1.2.2 Non sex chromosomes in humans

1.2.3 The manipulation of an organism's genes to obtain a desired characteristic

1.2.4 Alleles controlling all the blood groups

(4 x 1) **(4)**

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 1.3.2) in the ANSWER BOOK.

	COLUMN I		**COLUMN II**	
1.3.1	An organism possesses two factors which separates so that each gamete contain only one of these factors	A B	law of dominance principle of independent assortment	
1.3.2	A genetic disorder caused by a chromosomal mutation	A B	Haemophillia Colour Blindness	
			(2 x 2)	**(4)**

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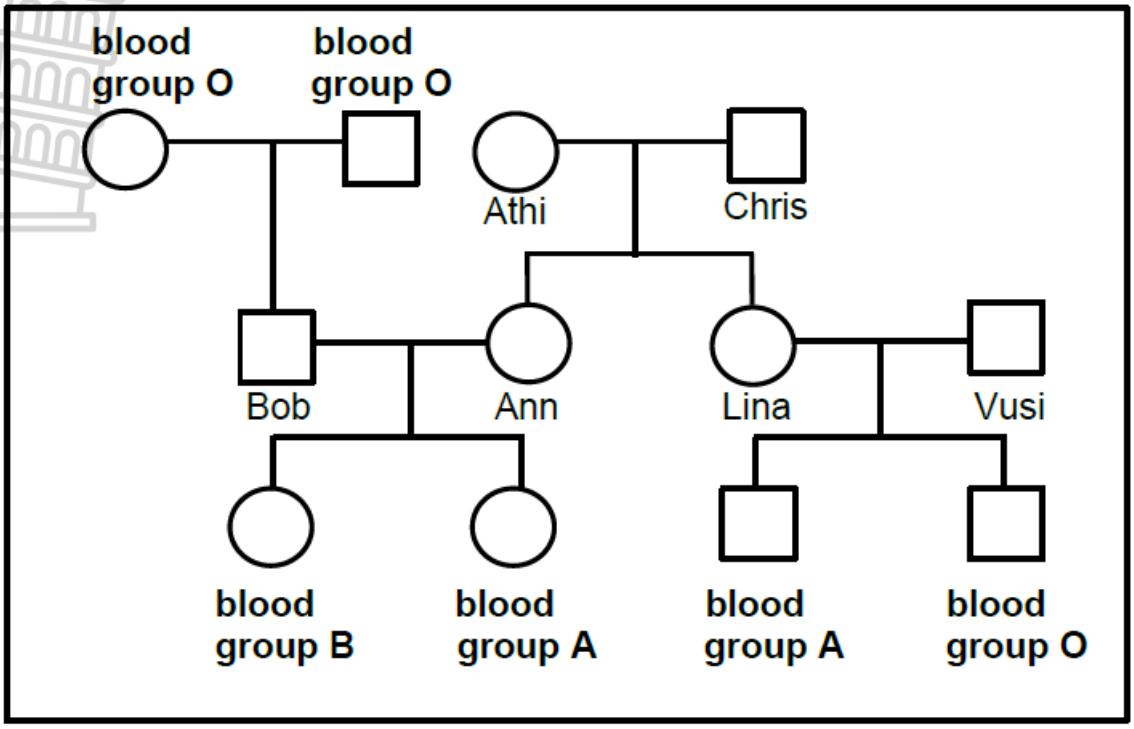
1.4 The diagram below shows the inheritance of blood groups in a family.



1.4.1 Name the type of diagram shown. (1)

1.4.2 The number of alleles that control blood groups. (1)

1.4.3 Lina's genotype is I^Ai. (2)
State ALL the possible genotypes of Vusi

1.4.4 Give the genotype of Bob (2)

[6]

TOTAL SECTION A: 20

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SECTION B

QUESTION 2

2.1 Read the extract below.

> Researchers have discovered that members of a particular family have high bone density that may be caused by a gene mutation. High bone density reduces the risk of bone fractures.
>
> Twenty members of the family had their bone density measured and DNA samples taken. Seven had high bone density. The high bone density occurred throughout their bodies but especially in the spine and hips.

2.1.1 From the extract, identify TWO areas in the body where bone density can mainly be measured. (2)

2.1.2 Describe what a gene mutation is. (2)

2.1.3 Explain why it was necessary for the researchers to collect DNA samples. (2)

2.1.4 Calculate the percentage of the family members who had normal bone density. Show ALL your workings. (3)
(9)

2.2 Polydactyly is a condition that leads to extra fingers or toes. It is caused by a dominant allele.

A man who is heterozygous for polydactyly has a wife who is not polydactyl.

2.2.1 Using the letter **R** and **r**, do a genetic cross to show the percentage chance that their children will have polydactyly. **(6)**
[15]

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QUESTION 3

3.1 In summer squash plants, white fruit colour (B) is dominant over yellow fruit colour (b), and round fruit (D) is dominant over oval fruit (d).

A summer squash plant that is homozygous for white and round fruit is crossed with a plant that is homozygous for yellow and oval fruit.

3.1.1 State the:

(a) Genotypes of the P_1 - parents (2)

(b) Phenotypes of the F_1 - generation (2)

3.1.2 Two plants that are heterozygous for both characteristics were crossed.

(a) Give ALL the possible genotypes in the **gametes** that will be formed (2)

(b) How many plants in the next generation are likely to have yellow and oval fruit? (1)

3.1.3 Give the possible genotypes of both parents that must be crossed if a farmer wants summer squash that are white with oval fruit only. (2)

[9]

3.2 Read the extract below.

> When a child is born, the umbilical cord is cut and stem cells can be obtained from it. Many people think that the stem cells for treating human conditions should be obtained from umbilical cords, rather than from human embryos.
>
> Recently, stem cells have also been obtained from bone marrow. These stem cells are used to treat conditions such as heart disease and spinal injuries.

3.2.1 Name THREE sources of stem cells mentioned in the extract. (3)

3.2.2 Explain why the characteristics of stem cells make them useful for treating some disorders. (2)

3.2.3 Name ONE condition in the extract that can be treated with stem cells. (1)

(6)

[15]

TOTAL SECTION B: 30

GRAND TOTAL: 50

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GRADE 12

LIFE SCIENCES

REVISION TEST : GENERAL EVOLUTION

MARKS: 50

TIME: 60 MINUTES

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.3) in the ANSWER BOOK, for example
1.1.4 D.

1.1.1 A scientific idea that still has to be tested is referred to as a …

A theory
B hypothesis
C fact
D belief

1.1.2 Darwin's theory of evolution is based on …

A use and disuse
B natural selection
C a tendency towards perfection in organisns.
D the passing on of acquired characteristics to offspring.

1.1.3 A group of similar organisms that occurs in a particular place at a particular time with the ability to interbreed

A Population
B species
C evolution
D speciation

(3 x 2) **(6)**

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 1.2.4) in the ANSWER BOOK.

1.2.1 Evolution characterised by long periods of no change alternating with short periods of rapid change

1.2.2 Organisms that are able to interbreed and produce fertile offspring

1.2.3 The process which results in all the individuals of a particular species dying out

1.2.4 Reproduction between closely-related individuals of the same species

(4 x 1) **(4)**

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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 1.3.2) in the ANSWER BOOK.

COLUMN I		COLUMN II	
1.3.1	Organisms have an inherent/internal drive to change	A: B:	Lamarck Darwin
1.3.2	Structures that have a similar basic construction, which indicates a common ancestor	A: B:	Homologous Analogous

1.4 Modern-day whales are aquatic mammals, spending their entire lives in the ocean. They are thought to have evolved from four-legged ancestors, as represented below.

SPECIES	EXISTENCE ON EARTH	CHARACTERISTICS
Pakicetus 	50 mya	Quadrupedal carnivore
Ambulocetus 	48 mya	Flipper-like large feet and tail for swimming
Dorudon 	40 mya	Large flippers in front and very small hind limbs
***Balaena* (Blue whale)** 	Present day	Non-functioning pelvis and large flippers in front

1.4.1 Which ancestor of whales most likely lived both in water and on land? (1)

1.4.2 Give ONE reason for your answer to QUESTION 1.4.1. (2)

1.4.3 Name TWO species that are adapted for swimming. (2)

1.4.4 For how long did Pakicetus exist, before Ambulocetus came into existance? (1)

(6)

TOTAL SECTION A: 20

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SECTION B

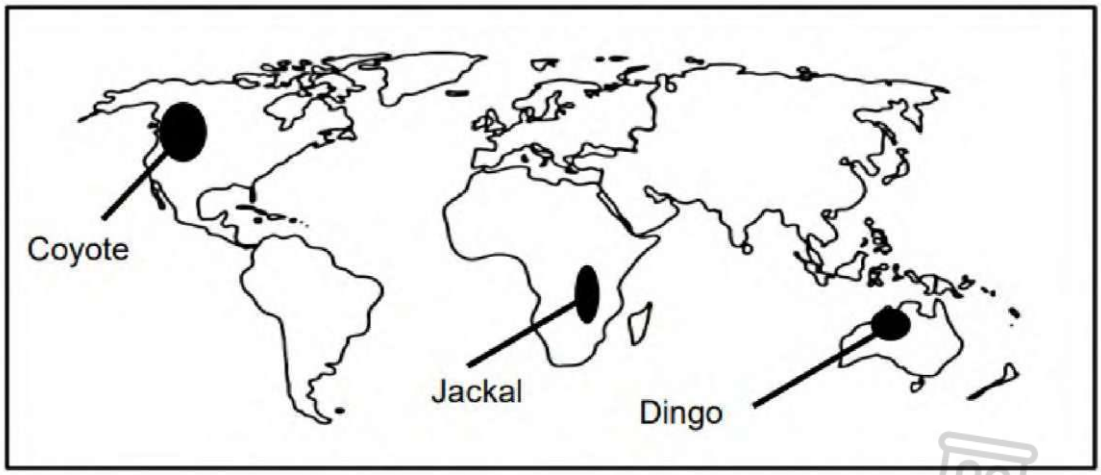
QUESTION 2

2.1 Some berries have red colour while others have a green colour. Green coloured berries are poisonous to herbivores. This is a defence mechanism as herbivores avoid them. Both berries are visible to herbivores.

It was observed that where red and green berries grow in the same field, there were more green berries.

Use Darwin's theory of evolution to explain why there were more green berries in this field. **(6)**

2.2 The present –day distribution of three closely related species of the dog family, the coyote, jackal and dingo, is shown on the world map below.



2.2.1 What type of evidence for evolution is represented here? (1)

2.2.2 What is a biological species? (3)

2.2.3 Describe how these three species could have evolved from a common ancestor (5)

(9)

(15)

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QUESTION 3

3. A farmer conducted an investigation to determine the effect of selective breeding on the growth of egg-laying and meat-production chickens.

The following steps were carried out:

- A farmer bought 30 one-day-old chickens from a commercial supplier.
- Fifteen of the chickens had been selectively bred for laying eggs and 15 of the chickens had been selectively bred for meat production.
- All the chickens were kept under the same environmental conditions.
- This included being fed the same chicken feed, made mostly from cereal grains and protein sources.
- The chickens were weighed regularly for a period of 40 days.

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

AGE (DAYS)	MEAT-PRODUCTION LIVE WEIGHT (grams)	EGG-LAYING LIVE WEIGHT (grams)
10	250	200
20	500	280
30	1500	500
40	2500	520

3.1. State the:

(a) Dependent variable (1)

(b) Independent variable (1)

3.2 State ONE advantage of repeating the investigation with 100 chickens. (1)

3.3 State THREE factors that were kept constant by the farmer in this investigation (3)

3.4 Calculate the percentage weight increase of the chickens that were selectively bred for meat between day 20 and day 40.

Show ALL working. (3)

3.5 State TWO benefits of the selective breeding of chickens, other than for increasing meat production (2)

3.6 Explain ONE reason why selective breeding of chickens for better meat production may not be an advantage if chickens were to live in the wild. (2)

3.7 State a conclusion for this investigation based on the results in the table. (2)

(15)

TOTAL SECTION B: 30
GRAND TOTAL: 50

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LIFE SCIENCES

TEST: HUMAN EVOLUTION

MARKS: 50

TIME: 60 Minutes

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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 1.1.3) in your ANSWER BOOK, for example 1.1.5 D.

1.1.1 The scientist who discovered the fossil 'Karabo' (A. sediba):

A Robert brown
B Lee Berger
C Raymond Dart
D Ronald Clarke

1.1.2 After the discovery of a fossil, scientists classified it as an African ape because it had a…

A large cranium, a prognathous jaw and large canines
B small cranium, a non-prognathous jaw and large canines
C small cranium, a prognathous jaw and large canines
D large cranium, a prognathous jaw and small canines

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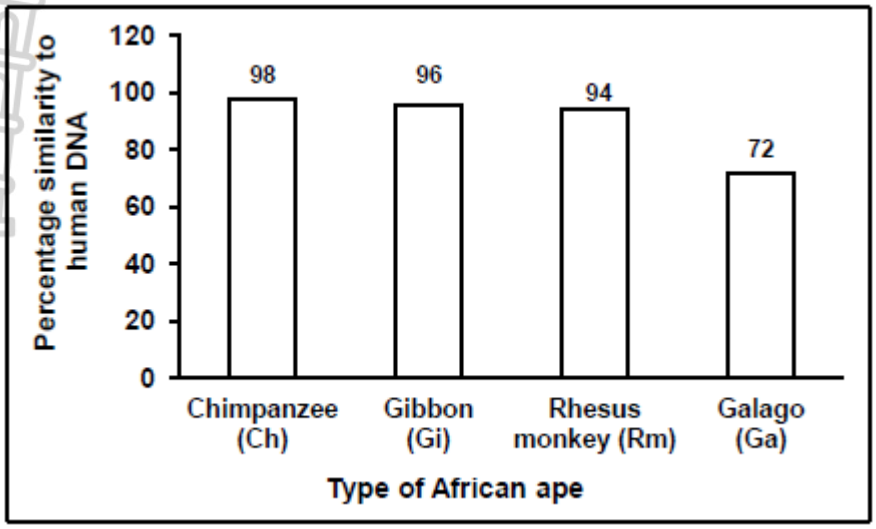
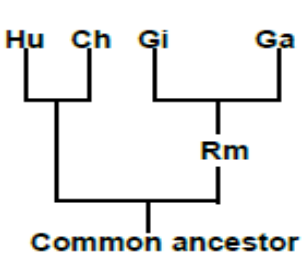
1.1.3 The graph below shows the percentage similarities between human (Hu) DNA and the DNA of some species of African apes.

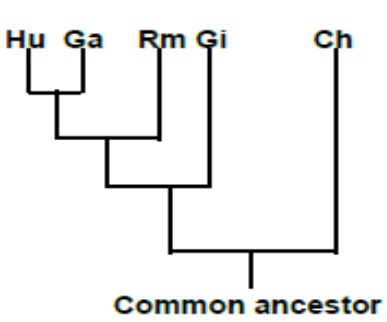


Which ONE of the following phylogenetic trees best represents the information in the graph?

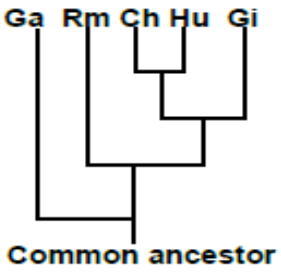
A



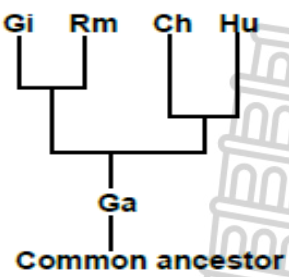
B



C



D



(3x2) **(6)**

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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 1.2.4) in the ANSWER BOOK.

1.2.1 Large, pointed teeth in African apes that are used for tearing food

1.2.2 The family to which humans belong

1.2.3 Having protruding jaws

1.2.4 A diagram representing possible evolutionary relationships between species

(4x1) **(4)**

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 1.3.2) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Well-developed brow rigdes	A: Homo sapiens B: Ardiphithecus sp.
1.3.2 Advantage of large brain size	A: Faster processing of information B: Process more information

(2x2) **(4)**

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1.4 The table shows the evolution of cranial capacity in some species.

SPECIES	PERIOD OF EXISTENCE (MILLION YEARS AGO)	AVERAGE CRANIAL CAPACITY (cm^3)
Sahelantropus	7.0-6.0	450
Australopithecus africanus	3,0-2,0	480
Homo habilis	2,2-1,6	650
Homo erectus	2,0-0,4	900
Homo neanderthalensis	0,4-0,04	1 500
Homo sapiens	0,2-0	1 450

1.4.1 Name:

(a) TWO hominid genera in the table above. (2)

(b) ONE fossil of A. africanus that was found in South Africa. (1)

1.4.2 Which hominid had a cranial capacity closest to that of Homo sapiens? (1)

1.4.3 When did Australopithecus africanus become extinct? (1)

1.4.4 Give the cranial capacity (in cm^3) of Homo species. (1)

[6]

TOTAL SECTION A: 20

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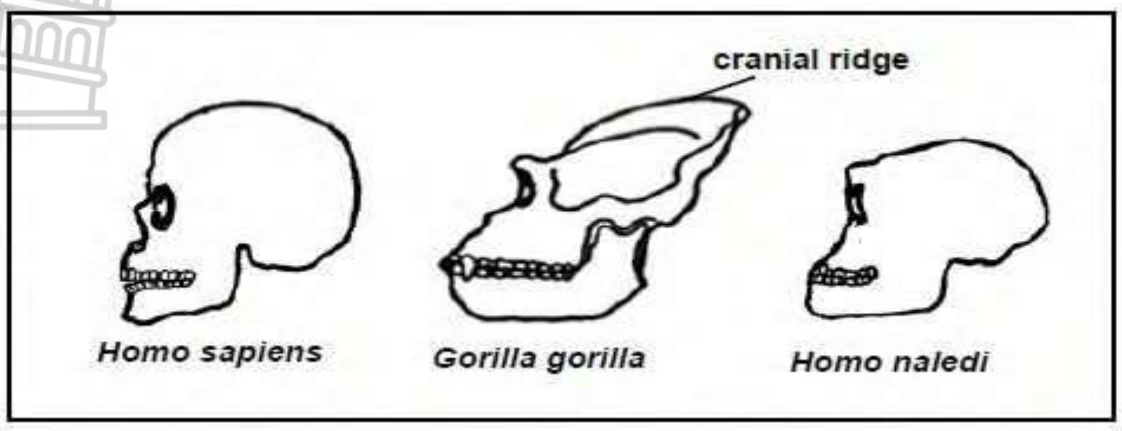
SECTION B
QUESTION 2

2. The diagram below represents the skull of hominids.



2.1. List THREE similarities in relation to vision that are shared by these organisms. (3)

2.2 Name ONE species in the diagram that was most prognathous. (1)

2.3 Describe TWO structures that caused the species named in QUESTION 2.2 to be most prognathous. (2)

2.4 *Homo naledi* was bipedal in most of its adult life.

Explain how the structure of *Homo naledi* skull would have assisted in bipedalism. (3)

2.5 Describe the difference between Homo sapiens and *Gorilla gorilla* in relation to the shape of the:

(a) Spine (2)

(b) Pelvic (2)

2.6 Explain why the *Gorilla gorilla* species has a cranial ridge. (2)

[15]

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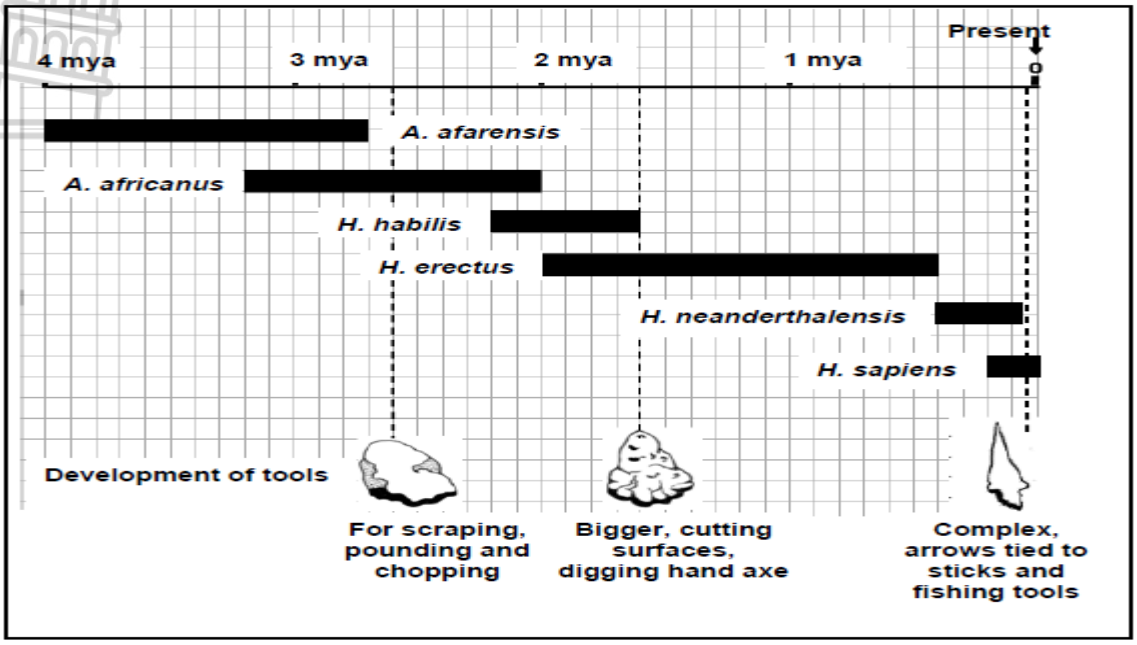
QUESTION 3

3.1. The diagram below shows the time line of different hominid species and the development of tools.



3.1.1 Which species in the diagram above existed/survived for the longest period of time? (1)

3.1.2 Calculate the period (million years) in which the A. afarensis and A. africanus co-existed. Show ALL workings. (2)

3.1.3 State ONE use of tools that was developed 2,6 mya. (1)

3.1.4 Identify ONE species that used complex tools. (1)

3.1.5 Explain how the change in the brain size over time relates to the development of tools (3)

(8)

3.2.

The 'Out of Africa' hypothesis is one explanation of the evolution of modern humans.

3.2.1 State the 'Out of Africa' hypothesis (2)

3.2.2 What genetic evidence is used to support the 'Out of Africa' hypothesis? (1)

3.2.3 Describe how fossil evidence is used to support the 'Out of Africa' hypothesis. (4)

(7)
[15]

TOTAL SECTION B: 30
GRAND TOTAL: 50

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Key Life Sciences Concepts

General tips to approach certain question types in the Life Sciences question papers

1. Multiple Choice

This question type is found in section A in the paper. Every multiple question starts with a stem in the form of a statement or question. Four possible answers are given from which you have to choose the correct one.

When answering multi-choice questions:

1. *Read the stem and cover/block the four possible answers. (Don't look at the answers at this stage)*
2. *Think about the question and think of the correct answer.*
3. *Then uncover the 4 possible answers.*
4. *If you see your answer, circle the LETTER.*
5. Look at the other possible options to check that none of the other options is a better option than the one you have chosen.
6. If you do not see your possible answer, then cross out the 3 options that you think are probably incorrect.
7. NEVER leave a multiple-choice question UNANSWERED.

EXAMPLE

1. The part of the brain that receives nerve impulses from the semi-circular canals is the…

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

Stem: This refers to the question.
REMEMBER: The semi-circular canals are structures found in the human ear and they play a role in balance. The cerebellum in the brain controls balance.
Answer: Therefore the correct answer is option **B. Why are the other options incorrect?** The cerebrum is responsible for interpreting the senses (e.g. hearing) and not for balance. The hypothalamus is responsible for most homeostatic control mechanism (e.g. thermoregulation). The medulla oblongata controls involuntary actions (e.g. heart beat).

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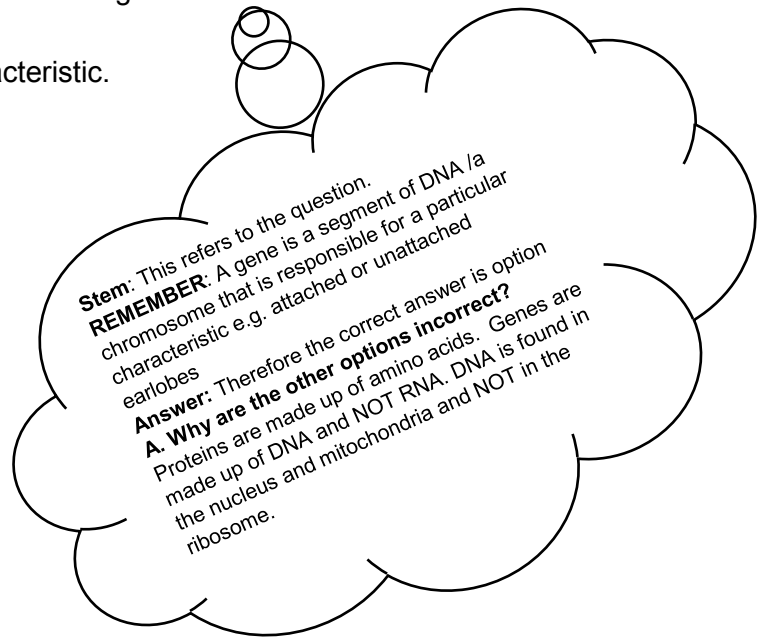
2. Which ONE of the following is TRUE about genes? Genes are …

A codes for a particular characteristic.
B made up of amino acids.
C made up of RNA.
D found in a ribosome.



2. Terminology

Terminology is the key for understanding Life Sciences. You need to understand the biological terms in order to be able to understand the question and to have the necessary vocabulary to answer the questions:

Paper 1 and Paper 2

3. Matching of columns

This question type is found in section A in the paper. Normally a key is provided to be used to present your answer to the question.
Every question starts with a description or statement. TWO possible answers are provided.

When answering this question:

1. *Read the description and each possible answer separately.*
2. *If the possible answer is correct make a ✓ next to the possible answer. If the possible answer is incorrect make an **X** next to the possible answer.*
3. *Use the key to present your answer.*

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EXAMPLE

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.

COLUMN I	COLUMN II
1. A young bird is helpless soon after hatching	A: Precocial development X B: Altricial development ✓

Read the statement in column I with possible answer A. It is incorrect (Refer to list of terminology in Paper 1). Place an X next to it. Read the statement in column I with possible answer B. It is correct. Place a √ next to it. Now use the key to present your answer. Because only possible answer B is correct your answer will be **B only.**

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.

COLUMN I	COLUMN II
1. A sex-linked genetic disorder	A: Haemophilia ✓ B: Colour-blindness ✓

Read the statement in column I with possible answer A. It is correct. Place a √ next to it. Read the statement in column I with possible answer B. It is correct. Place a √ next to it. Now use the key to present your answer. Because both possible answers are correct your answer will be **Both A and B.**

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4. Drawing and interpreting a graph

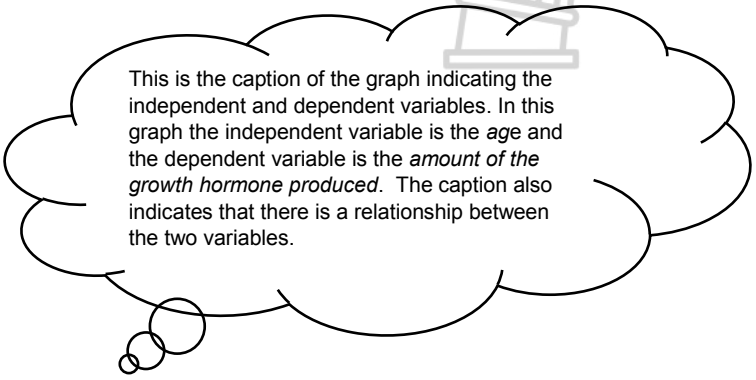
A Drawing of a graph

- Make sure that you know the difference between a line graph, bar graph, histogram and a pie chart.
- Always provide a heading for your graph that includes both independent and dependent variables.
- The independent variable refers to the factor that is being investigated. This factor is usually manipulated /changed by the investigator at the start or during the course of the investigation.
- The independent variable is plotted on the x-axis of a graph.
- The dependent variable refers to the effect of the independent variable. This effect is **usually** measured in some way and appears on the y-axis of a graph.
- Label the x and y-axis which may include the units of measurement like ^{o}C, seconds, years, number of organisms, etc.
- Work out an appropriate scale for the axes.
- When drawing a bar graph, remember that the bars should be of equal width. The spaces between the bars should also be the same.
- When drawing a pie chart you must use a compass to draw the circle of the chart and a protractor to measure the angles in degrees of the different sectors.

B Interpreting a graph

- Read the caption of the graph to understand what is represented. The caption gives you the two variables that are under investigation and relationship between the two variables.
- Remember that the independent variable is on the X-axis and the dependent variable is on the Y-axis.
- In a line graph the shape of the line indicates the relationship between the two variables.

EXAMPLE



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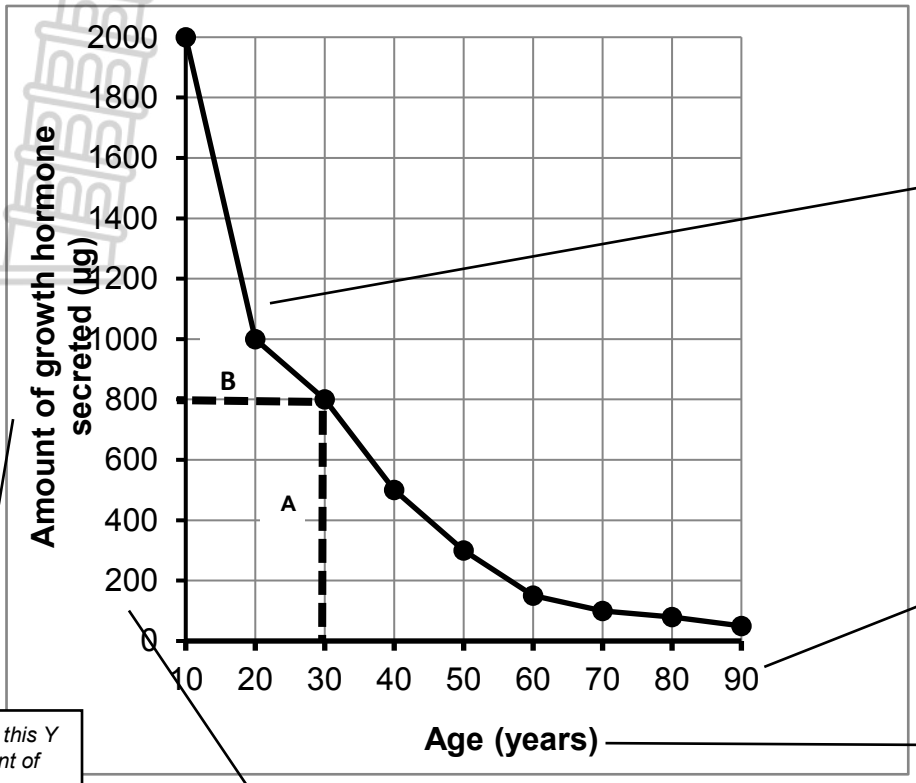
The graph below shows the relationship between the production of growth hormone and age.



The trend of the graph indicates that: as the age increases the amount of growth hormone secreted, decreases.

This is the scale of the X – axis. The intervals are of the same value of 10 years

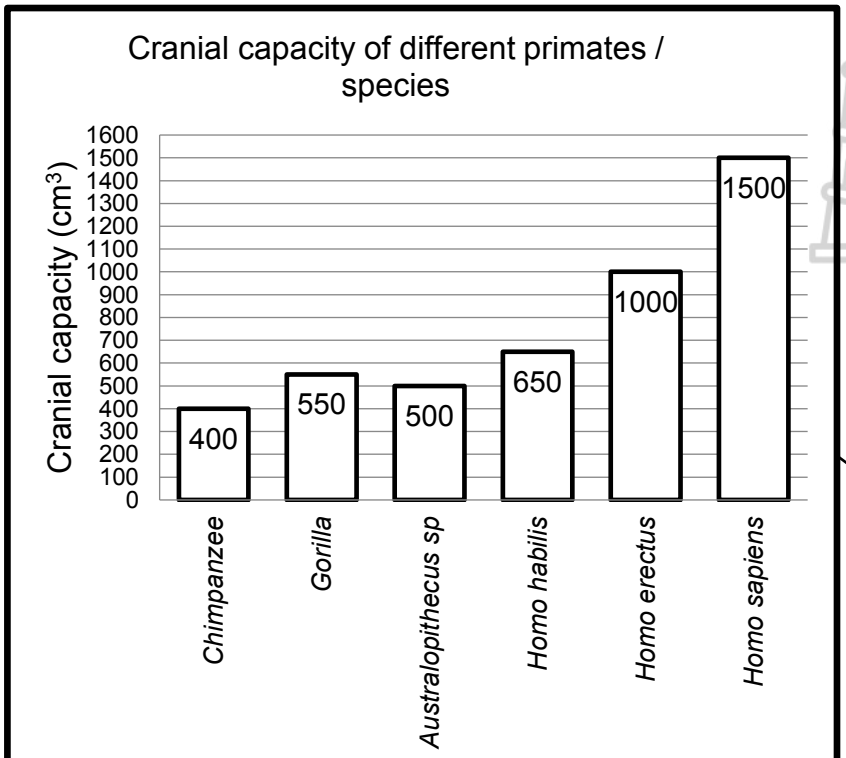
The label for this X-axis is age and the unit is year.

The label for this Y axis is amount of growth hormone secreted and the unit is µg

This is the scale of the Y– axis. The intervals are of the same value of 200 µg

You can be asked to read values from the graph e.g. how much of the growth hormone is secreted at 30 years?

Take a ruler and pencil and draw a vertical line (A) from the X-axis from point 30 until it touches the graph and then draw a horizontal line (B) from this crossing point to the Y-axis as indicated by the dotted line. Then read off the value on the Y-axis. In this graph the answer is 800 µg.



Note: The bars of the graph are the same width and the bars are equal distances apart from each other

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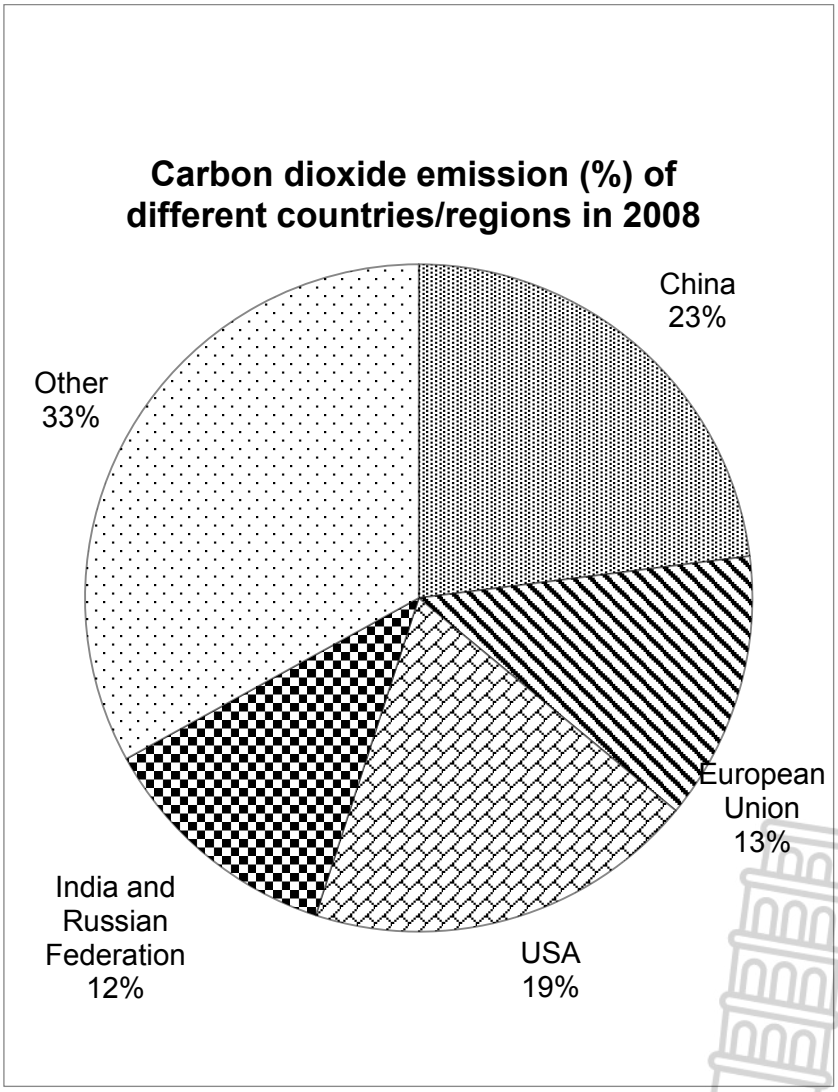
1. Which species has the smallest cranial capacity?

   Answer: Chimpanzee

2. Which species has the largest cranial capacity?

   Answer: Homo sapiens

Refer for step-by-step instructions on how to draw a pie chart and how to convert percentages into degrees in order to measure the angles of each sector.



1. Calculate the total amount of carbon dioxide emitted by China and the USA?

   Answer: 23% + 19% = 43%

   (Remember: 1 mark is for showing your working, 1 mark is for the final answer and 1 mark is for the unit)

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5 Interpreting a table

A table is used to organise and present data that were collected using a few words as possible.

A table should have a caption.

It is used as a summary of data.

A table is divided into rows and columns.

Each column and row may have its own heading with units if applicable.

Rows run from left to right across the table.

Columns are the vertical blocks of a table.

Tables are used to…

- record the results of an investigation
- illustrate certain patterns/trends
- compare things
- summarise information
- provide the data that will be used to construct a graph

EXAMPLE:

Carbon dioxide emission (%) of different countries/regions in 2008

COUNTRY	CARBON DIOXIDE EMISSIONS (%)
China	23
European Union	13
USA	19
India and Russian Federation	12
Other	33

[Adapted from www.environmentalprotectionagency.gov/climatechange]

This is the caption of the table The independent variable is the name of the country/region. The dependent variable is the percentage carbon dioxide emissions.

These are the 2 columns of the table

This table has 6 rows

6 Diagrams

When answering questions with diagrams:

Read the introductory statement/s of the diagram.

It will tell you what the diagram is about.

Study the diagram and write the missing labels on the diagram before looking at the questions based on it.

This will help you to focus on the topic.

Now read through the questions and answer each question.

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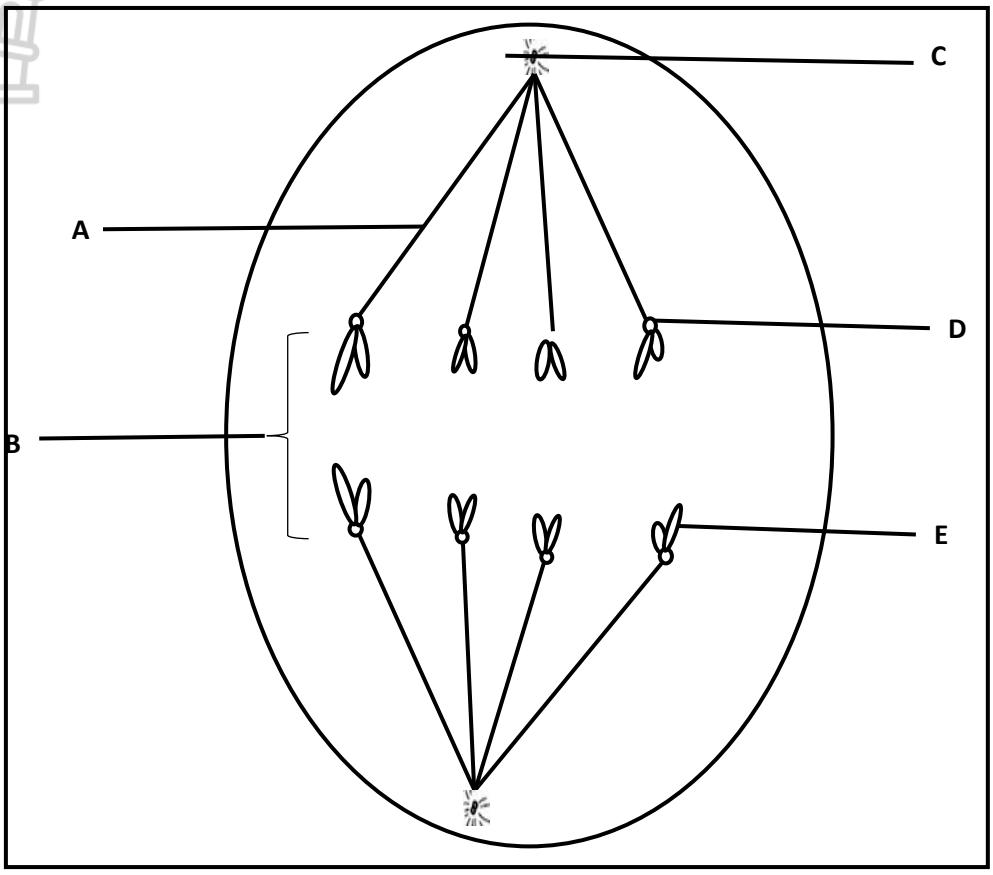
The introductory statement of this diagram tells you that it is about a certain phase in meiosis. If you know the process of meiosis and you are confident and careful you can score full marks in this topic.

EXAMPLE

The diagram below shows a phase during meiosis.



1.Identifypart:

(a) **A** *(Part A is the spindle fibre which holds/pulls the chromatids to the poles of the cell)*

(b) **B** *(Part B is a chromosome as it consists of 2 chromatids)*

(c) **C** *(Part C is the centriole which forms when the centrosome divides into two and moves to opposite poles of the cell during cell division)*

(d) **D** *(Part D is the centromere that holds two chromatids together)*

(e) **E** *(Part E is the chromatid – two chromatids and a centromere make up a chromosome)*

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2. Name the phase illustrated in the diagram above.
(The phase illustrated in the diagram is Anaphase II because it is chromatids and NOT chromosomes that are moving apart. If it was chromosomes that were moving apart the phase would have been Anaphase I)

3. How many chromosomes were present in the phase before the one shown in the diagram above?

(4 chromosomes were present because the phase before Anaphase II is called Metaphase II. Whole chromosomes would be present at the equator of the cell during Metaphase II)

4. How many chromosomes would be found in each gamete at the end of this division?
(4 chromosomes would be found in each gamete because the halving of chromosomes already occurred during Meiosis I. The parent cell must have had 8 chromosomes before meiosis started.)

5. Explain why the diagram above is NOT representative of a cell from a human being.
(This cell only shows 4 chromosomes i.e. 8 chromatids. A human cell in the same phase would have 23 chromosomes i.e. 46 chromatids)

6. State ONE place where meiosis takes place in the human male.
(Testes: Meiosis occurs when gametes are produced in the human reproductive organs. Sperm cells are produced in the testes of males. Ova are produced in the ovaries of females)

7 Calculations:

You will be expected to do simple calculations that involve addition, subtraction, multiplication and division.

You must have a calculator.

Show your working of your calculation step by step because marks are allocated for the steps as well as for the correct answer.

Include the unit in your final answer.

The following examples will guide you to calculate averages and percentages.

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A How to calculate averages:

Find the sum of all the items and divide this total by the number of items.

EXAMPLE:

The table below represents the results of an investigation that was carried out to determine the effect of caffeine on the pulse rates in different people after 10 minutes of drinking a cup of black coffee.

NUMBER OF PARTICIPANTS	PULSE RATE (BPM)
1	76
2	91
3	95
4	89
5	89

Remember to show your working of your calculation step by step because marks are allocated for the steps as well as for the correct answer.

Average pulse $= \frac{\text{sum of}}{\text{of participants}}$

participants

$$= \frac{(76 + 91 + 95 + 89 + 89)}{5}$$

$$= \frac{440}{5}$$

$$= 88 \text{ BPM}$$

Remember to include the unit in your final answer

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B Calculating Percentage:

Take the value of which you want the percentage of, and divide it by the total sum of items.

EXAMPLE:

The table below shows the number of plant species found at different altitudes in a mountain range.

ALTITUDE (m)	NUMBER OF PLANT SPECIES
1000	65
1500	60
2000	35
2500	20
Total	**190**

Calculate the percentage of plant species found at an altitude of 1500m.

$$\text{Percentage} = \frac{\text{number of plant species at 1500m}}{\text{Total number of plant species}} X \frac{100}{1}$$

$$= \frac{60}{180} X \frac{100}{1}$$

$$= 33.3\%$$

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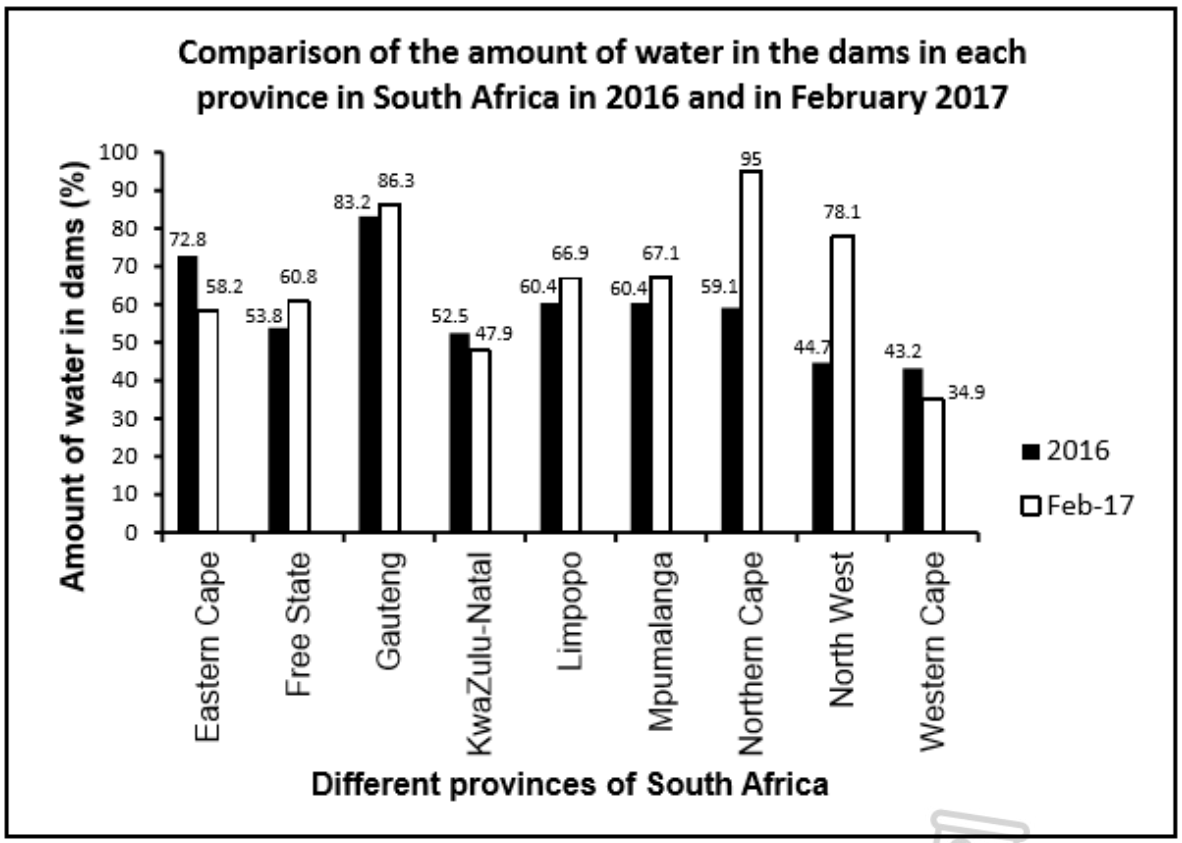
B Calculating Percentage increase:

Take the end value and sub track the start value; divide by the start value, and x 100 to give percentage.

EXAMPLE:

The graph below indicates the amount of water in the dams in each province shown as a percentage of the capacity of the dams. The information shows the amount of water in 2016 and at the end of February 2017.



The amount of water in the dams of North West increased by 33,4% from 2016 to February 2017. Calculate the percentage increase this represents in comparison to the amount of water in 2016.

$$\frac{78.1 - 44.7}{44.7} \times 100$$

= 74.7% or 75%

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8 Comprehensions

You may be asked to read a passage or extract from a newspaper or other source that you have never seen before. It will relate in some way to the work that you have studied and you may have to draw on knowledge that you have learnt to answer some of the questions.

Read the passage/extract carefully and underline the important information.
The first few questions normally relate directly to the passage/extract.
Try to link the content of the passage/extract to the content you have studied.

EXAMPLE:

Read the extract below.

DIABETES – TREATMENT AND MANAGEMENT

Two forms of diabetes are found in humans namely type I and type II.

With type 1 diabetes, the body's immune system mistakenly sees the insulin-producing cells in the pancreas as foreign, and destroys them.

People with type II diabetes are able to produce some of their own insulin. Often, it's not enough. Overeating, especially of foods rich in sugar, causes repeated stimulation of the pancreas, which responds by secreting large amounts of insulin. The excess insulin decreases the target cells' ability to respond to insulin. Treatment focuses on diet and exercise.

[Source: www.diabetesresearch.org]

1 Explain the consequence for **TYPE I** diabetics, when their immune system destroys their insulin-producing cells.
(Answer: The body cannot produce any insulin. ✓*The answer is coming from the text – the insulin-producing cells are destroyed and therefore no insulin is produced. But you can't stop here – the question asks you to explain the consequence, so you have to continue:*
high levels of glucose in blood ✓
therefore they have to inject themselves daily✓ to control the blood sugar level

2 Give TWO target cells in the human body whose ability to respond to insulin can decrease.
(Answer: Hepatic✓/Liver cells– *(that is where glucose is converted to glycogen)* and Muscle cells✓(*stimulates the cells to absorb glucose. This is knowledge you should have)*

3 Name ONE body fluid that can be used to test for the presence of excess glucose in the body.
(Answer: Blood✓ or Urine✓ - *this is knowledge you should have*)