



NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION 2015

LIFE SCIENCES: PAPER I

EXAMINATION NUMBER

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ANSWER BOOKLET

QUESTION 1

- 1.1 Select the term/word/words in Column B which best matches the description in Column A. Write the letter of the matching term in the appropriate space provided between the brackets. Each letter may only be used once.

Column A

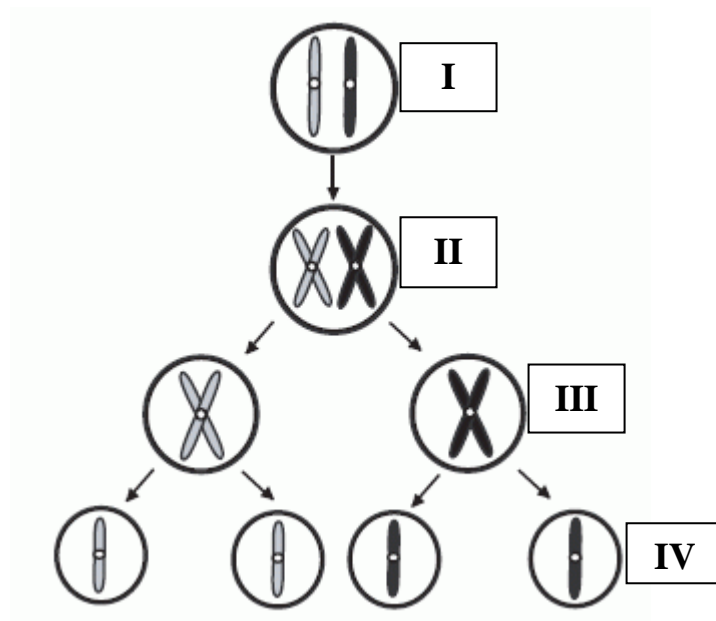
Column B

- | | |
|--|---------------------|
| [] The genetic makeup of an organism. | A Phenotype |
| [] When the number of chromosomes in all body cells of a human occur in pairs. | B Homozygous |
| [] The scientist/s who was/were awarded a Nobel prize for discovering the structure of DNA. | C Gene |
| [] The observable characteristics of an organism. | D Heterozygous |
| [] The crossing over points of chromosomes during meiosis. | E Homologous |
| [] Possessing unlike alleles for a particular trait. | F Diploid |
| [] A unit of heredity composed of DNA. | G Watson and Crick |
| [] A structure joining two chromatids of a chromosome after DNA replication. | H Genotype |
| [] Pairs of chromosomes at the start of meiosis. | I Chiasmata |
| | J Rosalind Franklin |
| | K Centromere |

- 1.2 Six multiple choice questions are given below. Choose the most correct alternative in each question and write only the letter of the most correct answer in the space provided in the table.

Question	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5	1.2.6
Answer						

Questions 1.2.1 to 1.2.3 are based on the diagram below.



- 1.2.1 The process shown in the diagram is known as ...

A mitosis.
 B spermatogenesis.
 C meiosis.
 D cell division.

(1)

- 1.2.2 The four cells at the end of the process can best be described as ...

A four haploid gametes.
 B cells with the same chromosome number as the original cell.
 C four diploid gametes.
 D sperm cells.

(1)

- 1.2.3 The first cell/s showing that reduction division has occurred is/are numbered ...

A I.
 B II.
 C III.
 D IV.

(1)

- 1.2.4 The DNA profiles below were taken from evidence at a crime scene and three possible suspects. Which of the DNA profiles is likely to belong to the criminal?



- A Suspect 1
 B Suspect 2
 C Suspect 3
 D None of the suspects were at the crime scene
- (1)

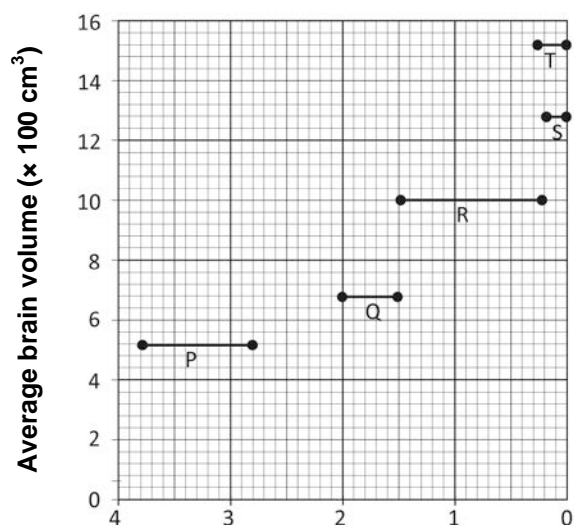
- 1.2.5 The diagram below shows a section of a chromosome with ten genes represented by the letters A to J, and an altered gene sequence of the same section after a mutation. What type of chromosome mutation is this?

A B C D E F G H I J Section of chromosome before mutation

A B C D E F G H F G H I J Mutated section of chromosome

- A deletion
 B translocation
 C point
 D duplication
- (1)

- 1.2.6 Study the graph below showing the average brain volume of several related species of hominid and the time periods during which each lived. Which of the following statements is a correct conclusion that can be drawn from the graph?



Key

P – *Australopithecus afarensis*

Q – *Homo habilis*

R – *Homo erectus*

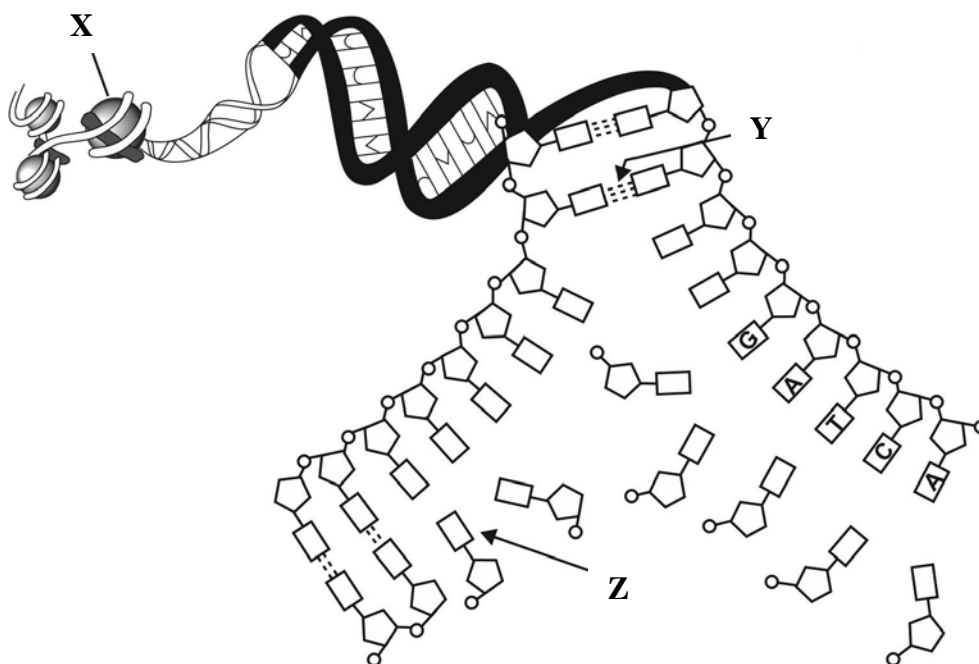
S – *Homo sapiens*

T – *Homo neanderthalensis*

Time (millions of years before present)

- A The most recent hominid species, S and T, have the largest brain capacity
- B *Homo erectus* had the smallest brain volume
- C P and Q lived at the same time
- D *Australopithecus afarensis* is a direct ancestor of *Homo sapiens* (2)

- 1.3 The diagram below shows part of a DNA molecule during replication. Use your own knowledge and the diagram below to assist you in answering the following questions:



- 1.3.1 Name molecule X which is associated with the tightly coiled DNA.

(1)

1.3.2 Provide a suitable label for Y.

_____ (1)

1.3.3 Draw a circle around any ONE nucleotide and label the following on it:

a deoxyribose sugar molecule

a phosphate molecule (3)

1.3.4 Name the complementary DNA nitrogenous bases of the following:

Adenine: _____

Guanine: _____ (2)

1.3.5 What is the role of the enzyme DNA polymerase in the replication process shown on page iv?

_____ (1)

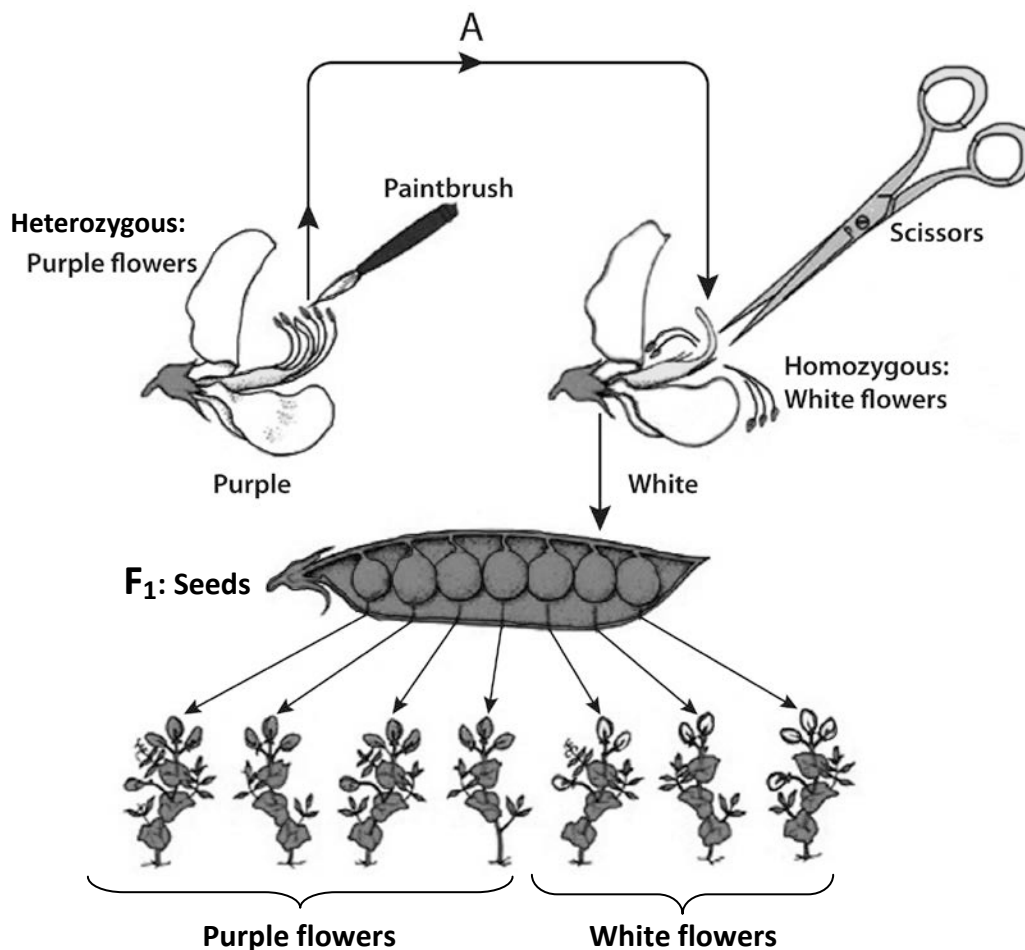
1.3.6 Briefly explain what is happening at Z.

_____ (3)

1.3.7 What is the purpose of DNA replication?

_____ (2)

- 1.4 The following diagram illustrates one of Mendel's pea breeding experiments. Use this diagram to answer the following questions.



- 1.4.1 Explain what is happening at A with the paintbrush and scissors.

(2)

- 1.4.2 Write the correct **genotypes** and the expected genotypic results in the text boxes below to illustrate the genetic cross between the pea plants with purple flowers and the pea plants with white flowers **shown above**. **P** = purple flowers; **p** = white flowers.

(a) Parents: Purple flowers × White flowers

(2)

(b) Gametes: or

 or

(2)

(c) F₁ genotypic ratio:

(2)

- 1.4.3 What was the expected F_1 phenotypic ratio in the cross in Question 1.4 on page vi? (1)

- 1.4.4 State why a phenotypic ratio is only an indication of the probability of the numbers of offspring with purple or white flowers.

(2)

[40]