

LIFE SCIENCES: PAPER I

EXAMINATION NUMBER

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

ANSWER BOOKLET

There are (vii) pages in this Answer Booklet.

QUESTION 1

Answer this question in the spaces provided. Place this Answer Booklet inside the Answer Book in which you answer the rest of the examination paper.

- 1.1 Select the name/or term in Column II which best matches the description in Column I. Write the letter of the matching name/term in the appropriate space provided between the brackets. Each letter may only be used once.

Column I

- [] The scientist who proposed the theory of natural selection.
- [] The breeding of modern dogs to select favoured characteristics.
- [] The scientist who proposed the theory of 'acquired characteristics'.
- [] The physical appearance of an individual with regards to a specific trait.
- [] Small changes in allele frequencies within a single species which can lead to formation of a new species.
- [] A change in the base sequence of DNA.
- [] The mating of individuals which are not closely related.

Column II

- A** Mutation
- B** Sympatric speciation
- C** Charles Darwin
- D** Genotype
- E** Microevolution
- F** Outbreeding
- G** Artificial selection
- H** Phenotype
- I** Lamarck

(7)

1.2 The table below contains statements in the first column. If the statement is correct, place a ✓ in the second column. If the statement is incorrect, place an X in the second column and correct the statement by replacing the **underlined** word/s in the correction column.

Statement	✓ of X	Correction
Mitochondrial DNA is used to determine <u>maternal</u> lineage.		
Sections of <u>coding DNA</u> are used to construct a DNA fingerprint.		
The <u>Out of Africa</u> hypothesis states that <i>Homo erectus</i> migrated into Europe and developed there and in other locations into <i>Homo sapiens</i> .		
<u>t-RNA</u> is a type of RNA that delivers amino acids to a ribosome during translation.		
Having two identical genes at the same locus is termed <u>heterozygous</u> for the characteristic.		

(5)

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

Question	1.3.1	1.3.2	1.3.3	1.3.4	1.3.5
Answer					

1.3.1 Two different species of pine trees growing in the same plantation release their pollen at different times during the year. This is known as:

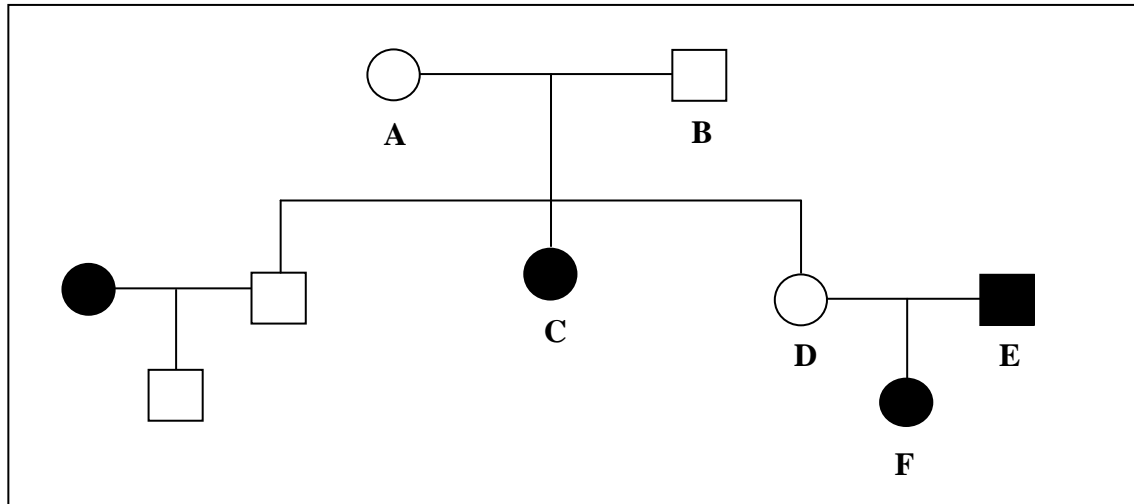
- A reproductive isolation
- B the founder effect
- C allopatric speciation
- D gene flow

(1)

Question 1.3.2 to 1.3.5 are based on the family pedigree below.

Study the following pedigree illustrating the inheritance of a genetic disorder. The black shaded squares represent males with the disorder and the black shaded circles illustrate females with the disorder.

- = normal males
- = normal females



1.3.2 The disorder illustrated in the pedigree above is most probably inherited as:

- A an autosomal recessive allele
 - B an X-linked dominant allele
 - C an autosomal dominant allele
 - D a Y-linked recessive allele
- (1)

1.3.3 The genotype of C is best described as:

- A heterozygous dominant
 - B heterozygous recessive
 - C homozygous dominant
 - D homozygous recessive
- (1)

1.3.4 What is the probability of a second child of D and E inheriting the disorder?

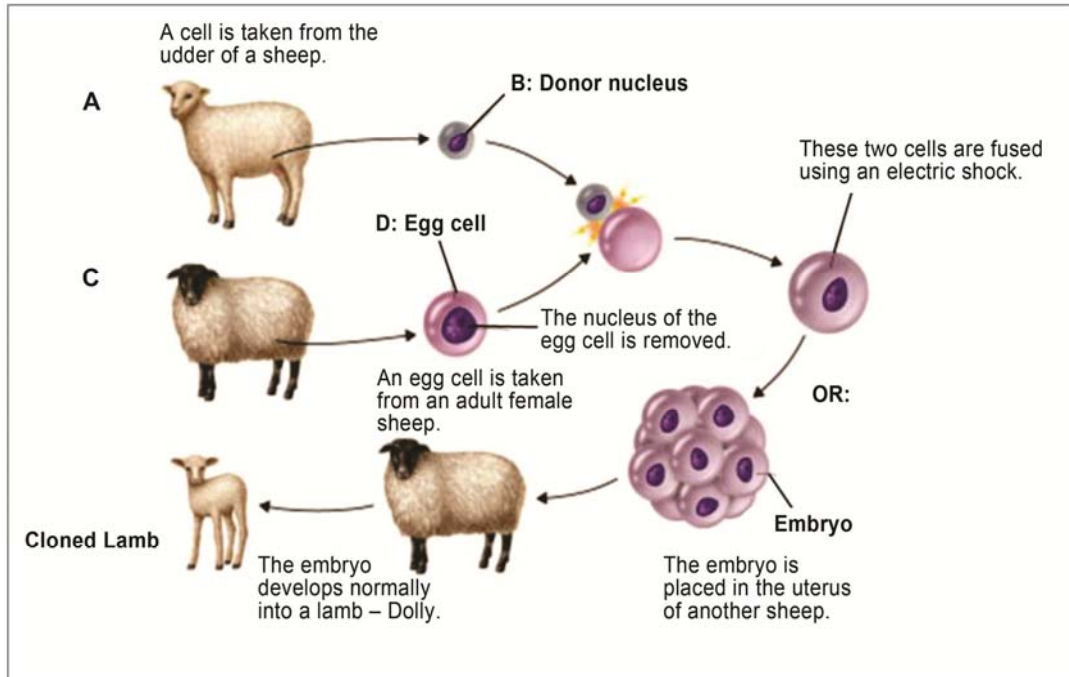
- A 100%
 - B 75%
 - C 50%
 - D 25%
- (2)

1.3.5 The best explanation for the inheritance of the disorder in F is that she received:

- A an allele for the disorder only from her mother
 - B two alleles for the disorder from her father
 - C one allele for the disorder from each parent D and E
 - D a genetic mutation passed on from her mother
- (1)

1.4 In 1997, scientists from the Roslin Institute in Scotland cloned a lamb from a cell taken from the mammary gland (udder) of a sheep.

Study the diagram below which illustrates the process used to produce Dolly, the cloned lamb.



[<<http://msjaffretechlab.com>>]

1.4.1 Which of the following statements about the process shown in the diagram above are True and which are False? Place a tick (✓) in the correct box.

- (a) This is a type of reproductive cloning, known as somatic cell nuclear transfer. True False (1)
- (b) The cell at D is a somatic cell. True False (1)
- (c) This process results in a clone which has exactly the same genes as the somatic cells of the donor mother. True False (1)
- (d) The embryo contains half the genetic information from cell B and half the genetic information from cell D. True False (1)
- (e) The lamb is an example of a clone obtained from the nucleus of a gamete. True False (1)

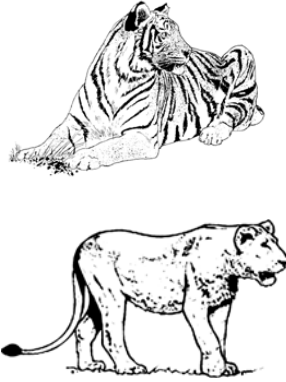
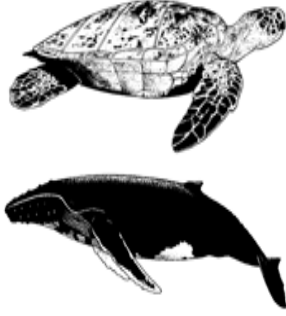
1.4 1.4.2 On the diagram on the previous page, label the following:

- surrogate mother
 - a stage where mitosis is taking place
- (2)

1.4.3 Suggest ONE reason why a farmer might consider having one of his livestock animals cloned, e.g. a cow or a sheep.

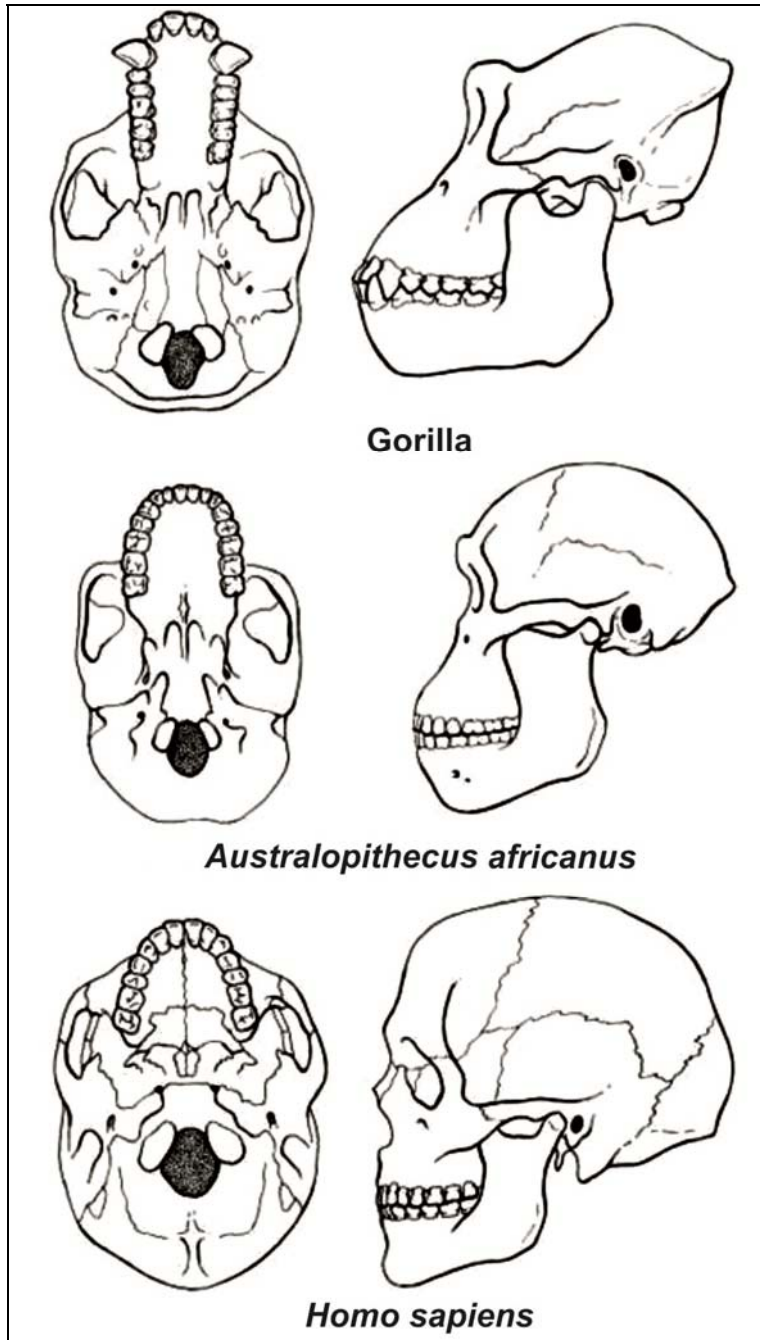
(2)

1.5 In the table below organisms are placed in pairs illustrating divergent and/or convergent evolution. The organisms are not drawn to scale. Study the diagrams of the organisms and place a tick ✓ in the column which indicates whether the pairs represent examples of divergent or convergent evolution. In the last column state ONE clearly explained reason for your choice.

Pairs of organisms	Convergent	Divergent	Reason for choice
(a) 			
(b) 			

(4)

1.6 Study the diagrams of three primate skulls drawn below. (Diagrams are drawn to scale.)



[<www.welchco.com>]

1.6.1 Which TWO skulls represent hominids in the above diagram?

(2)

1.6.2 Name ONE South African example of *Australopithecus africanus* that you studied.

(1)

1.6.3 (a) Compare the positions of the foramen magnum of *Homo sapiens* and the Gorilla.

(2)

(b) Which of these skulls in Question 1.6.3 (a) best indicates habitual bipedalism and give a well explained reason for your answer?

(2)

1.6.4 Explain ONE other feature that indicates evolutionary development in the skulls seen in the diagram.

(2)
[40]