Lisachem Materials

Chemistry Physics Biology
Psychology

VCE BIOLOGY 2006
TRIAL EXAM Year 12
Unit 4

Time allowed 90 minutes
Total Marks 75

QUESTION AND ANSWER BOOKLET
Structure of Booklet

Section	Number of Questions	Number of Questions to be Answered
A	25	25
B	8	8

Answer Multiple Choice questions by circling the appropriate letter on the answer sheet attached. Use space provided below question in Short Answer section.

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Student Name.....

VCE Biology 2006 Year 12 Trial Exam Unit 4

Student Answer Sheet

Answer each Multiple Choice question by circling the appropriate letter. Use a pencil. If you make a mistake erase and enter the correct answer. Marks will not be deducted for incorrect answers.

Write your answers to Short Answer Section in the space provided directly below the question.

Multiple Choice

Question 1	A	B	C	D
Question 2	A	B	C	D
Question 3	A	B	C	D
Question 4	A	B	C	D
Question 5	A	B	C	D
Question 6	A	B	C	D
Question 7	A	B	C	D
Question 8	A	B	C	D
Question 9	A	B	C	D
Question 10	A	B	C	D
Question 11	A	B	C	D
Question 12	A	B	C	D
Question 13	A	B	C	D
Question 14	A	B	C	D
Question 15	A	B	C	D
Question 16	A	B	C	D
Question 17	A	B	C	D
Question 18	A	B	C	D
Question 19	A	B	C	D
Question 20	A	B	C	D
Question 21	A	B	C	D
Question 22	A	B	C	D
Question 23	A	B	C	D
Question 24	A	B	C	D
Question 25	A	B	C	D

VCE Biology 2006 Year 12 Trial Exam Unit 4

Multiple Choice Section

Question 1.

Independent assortment refers to

A. chromosomes appearing in the cytoplasm during prophase by becoming independent of the nucleus.
B. the exchange of genetic material independently between homologous chromosomes during meiosis resulting in increased variation.
C. the chromosomes duplicating themselves independently during interphase in both meiosis and mitosis.
D. the separation of alleles of one gene on a chromosome having no influence on how the alleles of another gene on a different chromosome separate during gamete formation.

Question 2.

DNA polymerase is an enzyme that catalyses the formation of

A. messenger RNA from a DNA template.
B. a new DNA strand during DNA replication.
C. a new DNA strand from a messenger RNA template.
D. two separate DNA strands when the double helix of DNA unwinds.

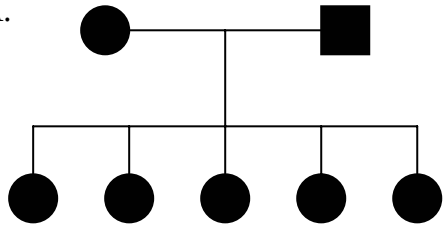
Question 3.

Messenger RNA is made up of a number of components. The component that is removed before m-RNA leaves the nucleus is the

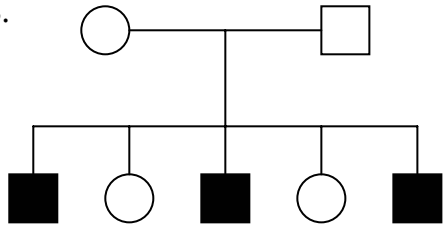
A. inhibitor.
B. exon.
C. promoter.
D. intron.

Question 4.
Which one of the following pedigrees could represent a sex-linked recessive pattern of inheritance (shaded individuals have the trait)?

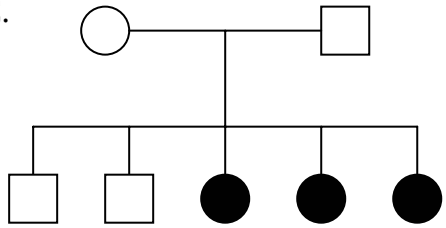
A.



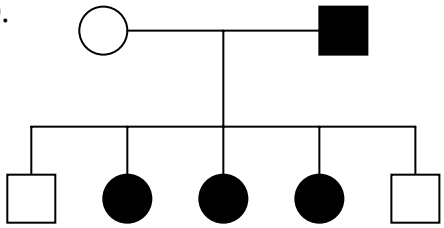
B.



C.



D.



Question 5.
Which one of the following crosses would produce homozygous offspring at both gene loci?

A. AABB x aabb.
B. aaBB x AAbb.
C. AABb x aabb.
D. AaBb x aabb.

Use the following information to answer questions 6 and 7.
In guinea pigs the genes for fur colour and coat length are on separate chromosomes. The allele for black fur (B) is dominant over the allele for white fur (b); while the allele for short coat (H) is dominant over the allele for long coat (h).

Question 6.
If a student had a guinea pig with black fur and a short coat; what genotype would the student use to determine if the black fur with a short coat guinea pig is homozygous or heterozygous for the two genes that determine the fur colour and coat length?

A. AAHH.
B. AAhh.
C. aaHH
D. aahh.

Question 7.
Another student decided to cross a male and female guinea pig that were both heterozygous for the two genes that determine fur colour and coat length. What would be the phenotypic ratio in a large number of offspring that result from this cross?

A. 1 black/short : 1 black/long : 1 white/short : 1 white/ long.
B. 9 black/short : 3 black/long : 3 white/short : 1 white/ long.
C. 4 black/short : 3 black/long : 2 white/short : 1 white/ long.
D. there is not enough information provided to determine the phenotypic ratio.

Question 8.
The table below shows the percentage for each base found in a single strand of DNA.

Base	**Percentage**
Guanine	19
Adenine	31
Thymine	26
Cytosine	24

The percentage of each base that is contained in the messenger RNA that was transcribed from this single strand of DNA would be

A. cytosine 19 : guanine 24 : thymine 31 : adenine 26.
B. thymine 26 : cytosine 24 : guanine 31 : adenine 19.
C. guanine 24 : cytosine 19 : uracil 31 : adenine 26.
D. uracil 19 : adenine 31 : guanine 24 : cytosine 26.

Question 9.
Five pieces of DNA consisting of the following sizes 12kb, 9kb, 6kb, 3kb and 1kb were separated using gel electrophoresis. ***Figure 1*** below shows how the five pieces of DNA separated.

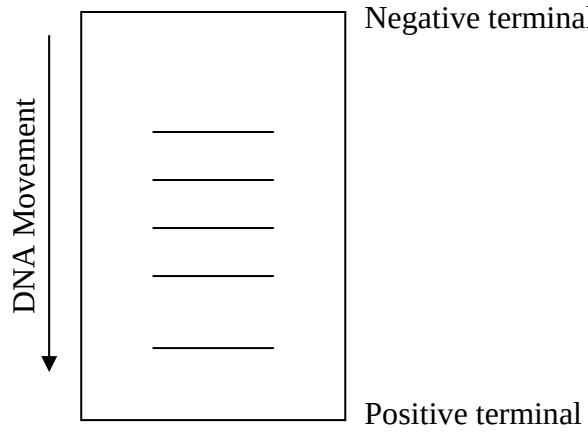


Figure 1

From the information provided in ***Figure 1*** above it is reasonable to conclude that

A. DNA is positively charged and therefore moves to the positive terminal.
B. DNA fragments separate according to their size with larger fragments moving faster than smaller fragments.
C. the size of the DNA fragment that moved furthest in the gel was 1kb.
D. the size of the DNA fragment that would move the most in the gel depends on the charge of the DNA molecule.

Question 10.
In humans, albinism is due to an autosomal recessive gene. If an albino male and his normal female partner, whose father was an albino, decide to have children; what is the probability of their children being albino?

A. 1.
B. ¼.
C. 0.
D. ½.

Question 11.
The MN blood group has two alleles M and N at its gene locus, which determine the presence of particular antigens on the surface of red blood cells. The alleles M and N are co-dominant. If two individuals both with blood type MN have children, how many different phenotypes are possible in their offspring?

A. 4.
B. 3.
C. 1.
D. 2.

Question 12.
A ligase enzyme

A. cuts DNA strands into either sticky ends or blunt ends.
B. can join together DNA strands from different species.
C. allows copy DNA to be made from single strands of RNA.
D. enables DNA strands to separate according to their size.

Question 13.
The chemicals that join together to make up a nucleotide found in DNA are a

A. five carbon sugar, one of four nitrogen bases and phosphate.
B. four carbon sugar, two of four nitrogen bases and phosphate.
C. six carbon sugar, one of four nitrogen bases and phosphate.
D. glucose sugar, one of four nitrogen bases and phosphate.

Question 14.
Natural selection acts upon an organism's

A. karyotype.
B. genotype.
C. genome.
D. phenotype.

Question 15.
Genetic drift can be best described as

A. random changes in allele frequencies within small populations.
B. the process that leads to evolutionary change and speciation.
C. the intensity of selection pressures acting on an organism's adaptations.
D. an organism's gene frequencies responding to changes in the environment

Use the following information to answer questions 16 and 17.
The cladogram in ***Figure 2*** below shows the evolutionary relationship between five species of new world vultures and storks.

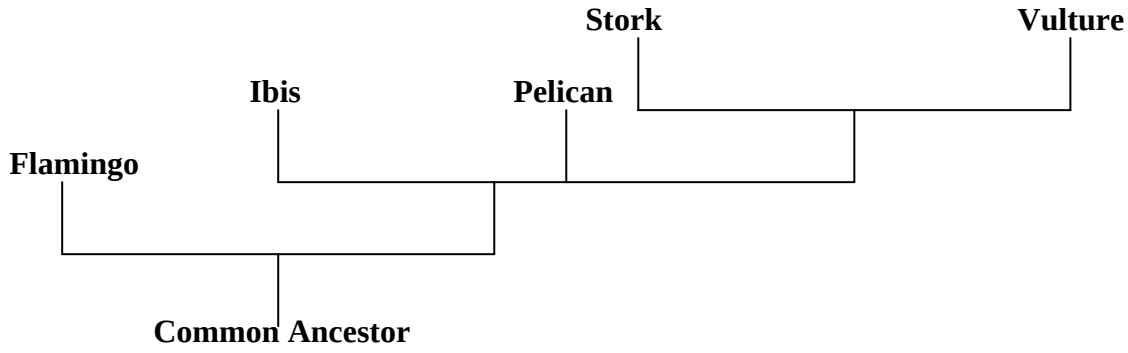


Figure 2

Question 16.
From the above cladogram in ***Figure 2***, it can be concluded that the two most closely related organisms are:

A. ibis and flamingo
B. ibis and stork.
C. stork and pelican.
D. stork and vulture.

Question 17.
After looking at the cladogram in ***Figure 2***, a student suggested that this could be an example of:

A. parallel evolution.
B. divergent evolution.
C. convergent evolution.
D. selective breeding of birds.

Question 18.
The graph in ***Figure 3*** below shows the changes in bacterial numbers of a resistant and non-resistant strain over a number of years to a particular antibiotic:

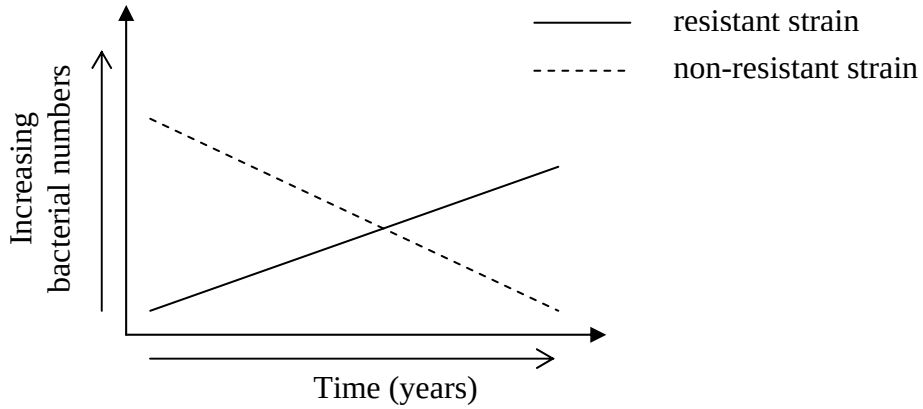


Figure 3

From your own knowledge and the information provided in ***Figure 3*** above one can conclude that:

A. the antibiotic has caused mutations which have resulted in an increased number of the resistant strain of bacteria.
B. over a period of time with the use of antibiotics the resistant strain of bacteria has a selective advantage over the non-resistant strain and increases its numbers.
C. the resistant strain of bacteria reproduce much more quickly than the non-resistant strain of bacteria.
D. over a number of years the amount of crossing-over in the resistant strain has increased resulting in greater variability and therefore resistance.

Question 19.
Which one of the following would provide evidence for cultural evolution in *Homo Sapiens*? The

A. remains of fossilized animals near skeletons of *Homo sapiens.*
B. position and size of teeth in the skull of humans.
C. presence of stone tools and implements in caves where humans once lived.
D. development of bipedalism and the ability to walk upright in search of food.

Question 20.
The diagram below in ***Figure 4*** shows a possible evolutionary relationship between six different species of hominids.

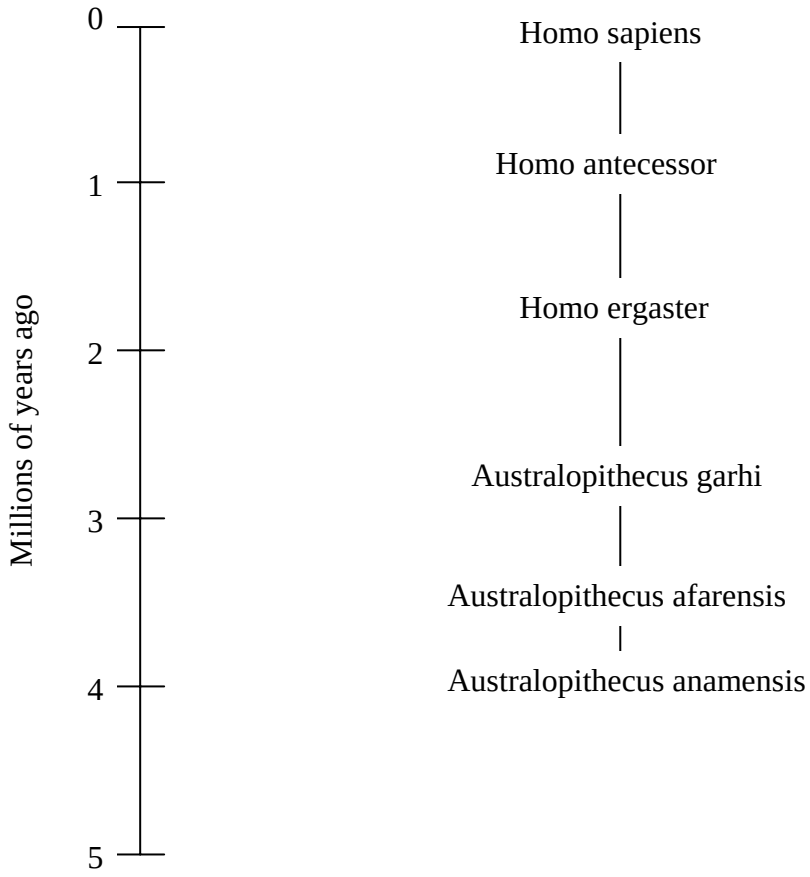


Figure 4

As humans evolved from their ape-like ancestors it could be concluded that:

A. the braincase and jaw became larger, while the teeth size was reduced.
B. *Australopithecus afarensis* would have a larger braincase than *Homo ergaster*.
C. *Australopithecus garhi* is the common ancestor to all species in the genus *Homo.*
D. the jawbones and teeth size were reduced in size and the forehead became more prominent.

Question 21.
Characteristics that organisms possess which are favoured by natural selection and enables the organisms to survive to sexual maturity and reproduce are the result of positive:

A. gene flow.
B. selection pressures.
C. allelic frequencies.
D. phylogenetic relationships.

Question 22.
Mitochondrial DNA is used to work out the evolutionary history and relationship of living species rather than nuclear DNA because mitochondrial DNA:

A. has lower mutation rates compared to nuclear DNA and is therefore more stable.
B. is subject to differentiation pressure and can therefore change from generation to generation.
C. only comes from the female and there is no recombination of genes.
D. will only combine with mitochondria from the sperm when the egg is fertilized.

Question 23.
Radioisotopes are used for dating fossils because they decay at a given rate and have a specific half-life. The graph in ***Figure 5*** below shows how the radioisotope carbon-14, which has a half-life of 5500 years, decays

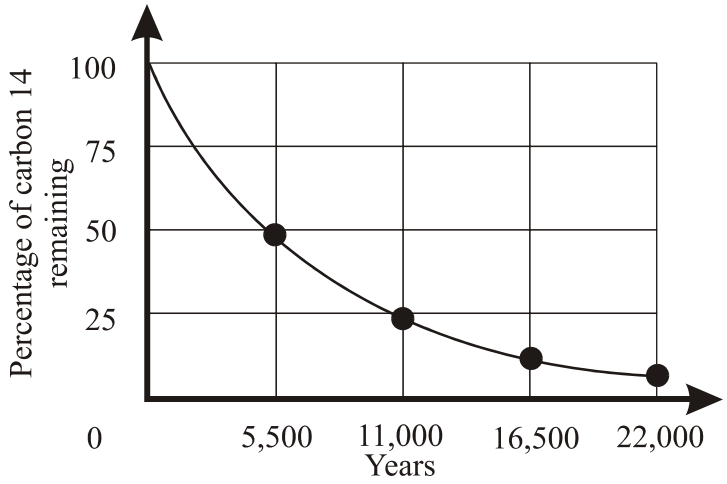


Figure 5

From the information provided by the graph in ***Figure 5*** above, one can conclude that the percentage of carbon-14 remaining after 16500 years is:

A. 12.5%.
B. 25%.
C. 50%.
D. 6.25%.

Question 24.
Interbreeding in allopatric speciation is prevented due to:

A. behavioural differences between two populations.
B. reproductive differences between two populations.
C. geographical barriers between two populations.
D. genetic variations between two populations.

Question 25.
Which one of the following statements is consistent with selective breeding? The

A. rise in antibiotic resistance of bacteria.
B. large variety of tomatoes found in agriculture.
C. differences between the various populations of people living on Earth.
D. gradual loss of species from this planet as a result of habitat destruction.

Short Answer Section

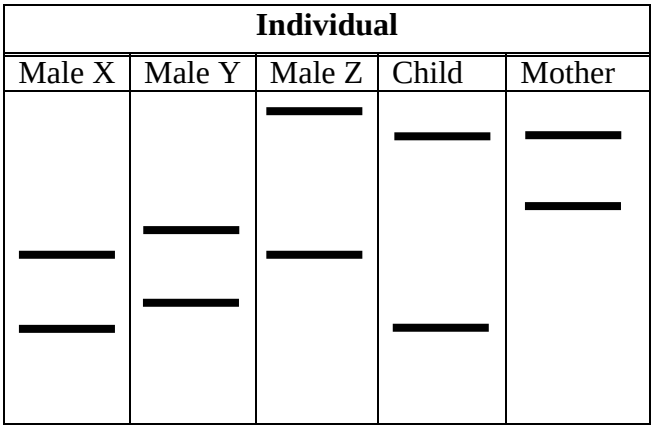
Question 1.

Two methods that can be used in attempting to identify the biological father of a child are the use of ABO blood groups and DNA fingerprinting. The results using ABO blood groups and DNA fingerprinting when trying to identify a particular biological father of a child are tabled below. In the ABO blood group there are 3 alleles; the alleles A and B are co-dominant, while both alleles A and B are dominant over allele O.

A – ABO Blood Group Results.

Individual	Blood Group
Male X	B
Male Y	A
Male Z	O
Child	O
Mother	B

B – DNA Fingerprinting Results.



a. Explain the meaning of co-dominant.

_____

_____

(1 mark)

b. How many different genotypes are possible in the population with respect to the ABO gene?

_____

(1 mark)

c. Which blood group is homozygous recessive?

_____

(1 mark)

d. From the ABO blood group results above which males, if any, could be the biological father of the child? Explain.

_____

_____

_____

_____

_____

_____

(2 marks)

e. From the DNA fingerprinting results which males, if any, could be the biological father of the child? Explain.

_____

_____

_____

_____

(2 marks)

f. Is the mother of the child homozygous or heterozygous for her blood group B? Explain.

_____

_____

_____

_____

(1 mark)

Total = 8 marks.

Question 2.

The pedigree in ***Figure 6*** below shows the pattern of inheritance for a particular genetic disorder over three generations in a family. Shaded individuals have the genetic disorder.

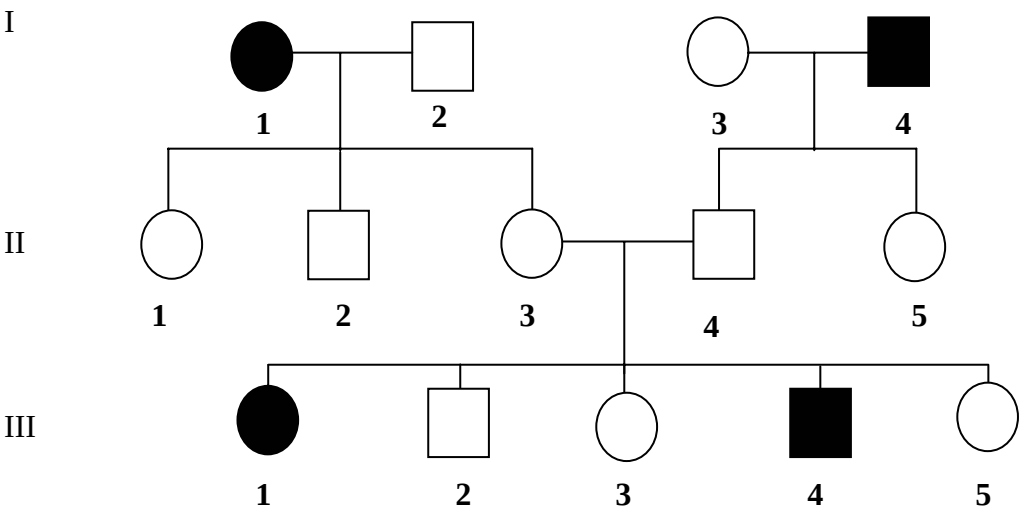


Figure 6

a. How is the genetic disorder shown in the pedigree above inherited?

_____

(1 mark)

b. Explain your answer for **2a** above.

_____

_____

_____

_____

(1 mark)

c. Using the letter **A** and/or **a** write down the genotypes of individuals II-3 and II-4. Explain your answer.

_____

_____

_____

_____

_____

(1 mark)

d. Using the same letters as in **2c** above, explain what the genotype of individual III-5 is likely to be?

_____

_____

_____

_____

(1 mark)

e. If individual III-1 has a male partner, whose family history going back many generations has no incidence of this genetic disorder, and they decide to have children; what is the chance that their children will have the genetic disorder? Explain.

_____

_____

_____

_____

(1 mark)

Individuals suffering from this disorder are unable to produce an enzyme that catalyses the conversion of metabolic wastes into harmless substances.

f. Briefly explain why individuals with this genetic disorder are unable to produce this enzyme.

_____

_____

_____

_____

_____

_____

(2 marks)

g. Name the test or procedure that can be used to identify specific genetic disorders in individuals.

_____

(1 mark)

Total = 8 marks.

Question 3.

Figure 7 is a diagrammatic representation of a process that occurs in the cells of all organisms.

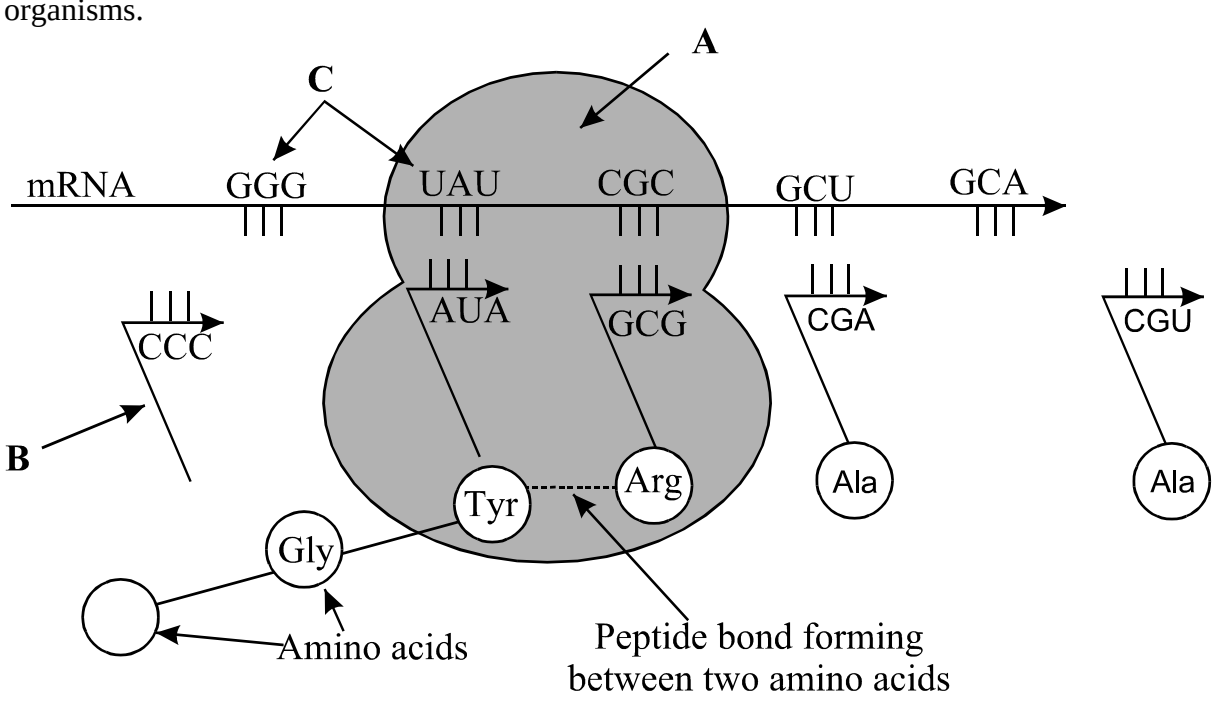


Figure 7

a. Name the process involved in ***Figure 7*** above

_____

(1 mark)

b. Name the parts labeled **A**, **B** and **C**.

_____

_____

_____

(1 mark)

*Use the table below to answer question **3c** below.*

m-RNA that code for particular amino acids							
CUU	Leucine	CAU	Histidine	CGU	Arginine	UAU	Tyrosine
CUC	Leucine	CAC	Histidine	CGC	Arginine	UAC	Tyrosine
CUA	Leucine	CAA	Glutamine (gln)	CGA	Arginine	UAA	Stop
CUG	Leucine	CAG	Glutamine (gln)	CGG	Arginine	UAG	Stop

c. The DNA molecule that codes for the second codon **UAU** on the m-RNA molecule in ***Figure 7*** above has a point mutation that results in **UAU** being changed to **UAA**. Briefly explain the consequences of this point mutation.

_____

_____

_____

_____

(1 mark)

d. Explain the meaning of mutation.

(1 mark)

e. How and from where did the information contained in m-RNA come?

(1 mark)

Total = 5 marks.

Question 4.

In modern genetic engineering there are many techniques used to manipulate DNA. This means it is now possible to incorporate DNA from one species into a different species. As well, with the complete mapping of the human genome our knowledge and understanding of genetic disorders and where they can be found on chromosomes has increased.

a. Explain the meaning of human genome.

(1 mark)

b. Why are vectors used in genetic engineering?

(1 mark)

c. Give one example of a vector used in genetic engineering.

(1 mark)

In forensic science, scientists sometimes find only a small segment of DNA at a crime scene, but they need to perform many tests on this.

d. How can forensic scientists obtain more copies of this original small segment of DNA?

(2 marks)

e. Is it possible to make DNA from a single strand of RNA? Explain.

_____

_____

_____

_____

_____

(1 mark)

Total = 6 marks.

Question 5.

Since placental mammals started evolving on Earth around 65 million years ago, there has been great diversification to occupy different niches. The carnivores are a large group of placental mammals of which there are hundreds of different living species and numerous fossil species. The fossil record of carnivores is incomplete. One feature that all land carnivores share is the basic structure of their fore and hind limbs.

a. Explain the meaning of extinction.

_____

_____

_____

(1 mark)

b. What is the name given to the limb of mammals that have evolved from the same basic pattern?

_____

(1 mark)

c. A student suggested that because of the structural similarity of the limbs between different species of carnivores, the limbs were analogous. Do you agree or disagree with the student? Explain.

_____

_____

_____

_____

(2 marks)

d. The cat family is a diverse group of carnivores that are found on all continents of the planet. Explain how two closely related but different species of the cat family could have evolved from a common ancestor.

_____

_____

_____

_____

_____

_____

(2 marks)

e. Briefly explain why the fossil record of carnivores is incomplete.

_____

_____

_____

_____

(1 mark)

f. After examining a fossil skull and jaws, what feature could indicate that the fossil is a carnivore?

_____

_____

(1 mark)

Total = 8 marks.

Question 6.

Scientists who are studying ant-eating mammals that are alive today have decided to look at the evolutionary relationship between 4 different species found on different continents. The pangolin is in Asia, the aardvark in South Africa, the ant bear in South America and the spiny anteater in Australia. Even though all appear similar in appearance they are not closely related. Furthermore, specimens of different extinct species from the fossil record of ant-eating mammals are similar and it is difficult to decide whether they are the same or a different species.

a. Name the pattern of evolution that results in species from different evolutionary branches resembling each other and having a similar appearance.

_____

(1 mark)

b. Briefly explain why it is difficult to decide whether similar looking fossil specimens belong to the same species or different species.

_____

_____

_____

_____

_____

_____

_____

_____

(2 marks)

c. What is meant by selection pressure?

(1 mark)

d. Explain how DNA hybridization could have shown the scientists that these four living species were not closely related.

(2 marks)

Total = 6 marks.

Question 7.

In studying human evolution and how modern humans evolved from our ape-like ancestors, palaeontologists at times have difficulty agreeing on how to interpret the fossil remains of hominids going back 4 million years. However, with the accumulation of more and more skeletons and skulls, palaeontologists agree on certain characteristics and traits that only belong to *Homo sapiens*.

a. Why do palaeontologists find it difficult to agree on how modern humans evolved from our ape-like ancestors?

(1 mark)

b. What term describes the modern human ability to walk upright?

(1mark)

c. Briefly describe the changes that occurred in the position of the foramen magnum as modern humans evolved the ability to walk upright.

(1 mark)

d. On which continent are the oldest hominid fossils found?

_____

(1 mark)

Total = 4 marks.

Question 8.

The evolution of *Homo sapiens* from our primitive ancestors like *Homo habilis* was biological. However, once *Homo sapiens* had evolved another evolutionary factor emerged which has had a significant and rapid impact. That evolutionary factor is cultural evolution. Over the last 10,000 years there has been no significant change in *Homo sapiens* physically; however there have been major and significant changes in our culture during this time. Furthermore, our knowledge and understanding of ourselves, other species and our environment has increased, especially with the rapid progress in and use of technology. Humans are now having an effect on not only our own evolution, but also other species on this planet, with our intervention in the evolutionary process.

a. Explain the meaning of cultural evolution.

_____

_____

_____

_____

(1 mark)

b. Briefly explain how genetic screening could impact on the human gene pool.

_____

_____

_____

_____

_____

_____

_____

(2 marks)

c. Some scientists have advocated the use of cloning to save endangered species. What impact is cloning likely to have on the endangered species' genetic diversity? Explain.

_____

_____

_____

_____

(1 mark)

d. Selective breeding has led to a number of domestic animal species having many breeds and cultivated plant species having many varieties. Briefly explain why some of these domesticated animal breeds and cultivated plant varieties are unlikely to survive natural selection.

_____

_____

_____

_____

(1 mark)

End of task **Total = 5 marks.**

Suggested Answers VCE Biology Year 12 Trial Exam Unit 4

Multiple Choice Section.

1 D	2 B	3 D	4 B	5 D	6 D	7 B	8 C	9 C
10 D	11 B	12 B	13 A	14 D	15 A	16 D	17 B	18 B
19 C	20 D	21 B	22 C	23 A	24 C	25 B		

Short Answer Section.

Question 1.

a. When both alleles in an heterozygous individual are dominant and are expressed equally and fully in the individual's phenotype (1).

b. Six (1).

c. Blood Group O (1).

d. All three males could be the biological father of the child. If male X, who is blood group B has the recessive allele O, this O allele would have contributed to the child's blood group O (1). Similarly, with male Y who is blood group A. Finally, since male Z is blood group O, he would definitely have contributed the O allele to the child's blood group O (1).

e. From the DNA fingerprint results, male X is the most likely biological father (1). Obviously the DNA fingerprints of the child matches the mother's; and the only other match in the DNA fingerprint results is male X (1).

f. The mother is heterozygous. Since the child is blood group O and the mother is blood group B, the mother must have the B and O alleles and not two B alleles. It is the O allele that has contributed to the child's blood group O. The other O allele comes from the father (1).

Question 2.

a. Autosomal recessive (1).

b. The genetic disorder is recessive because individuals III-1 and III- 4 show the genetic disorder but neither of their parents do. The trait must be autosomal because if it was sex-linked individual II- 2 would have the genetic disorder but he doesn't (1).

c. Individual II-3 is Aa and individual II- 4 is Aa. They are both heterozygous. Since individual I-1 and I- 4 are both homozygous recessive, they both contributed a recessive allele to their children. Individuals II-3 and II- 4 do not have the disorder so they must have received the dominant allele from their parents I-2 and I-3 respectively (1).

d. Individual III-5 could be Aa (heterozygous) or AA (homozygous). Since the genetic disorder is autosomal recessive and individuals II- 3 and II- 4 are both heterozygous; it means they could have contributed two dominant alleles to individual III-5 or they could have contributed either one dominant or one recessive allele each (1).

e. Individual III-1 is recessive, therefore their genotype is aa. Since her partner has no family history of the genetic disorder his genotype would most likely be AA. Therefore any children born would be Aa (heterozygous) and there is no chance that they would have the genetic disorder. (1).

f. Individuals with the genetic disorder are unable to produce the enzyme (protein) because the gene to code this protein is missing (1). This means there is no DNA strand to form the required codons on messenger RNA. With no m-RNA being formed there is no message being sent to the ribosomes to make the required protein, in this case the enzyme (1).

g. Genetic screening (1).

Question 3.

a. Translation or polypeptide synthesis (1).

b. A – ribosome; B – transfer RNA anticodon; C – codon.
3 correct – 1 mark. 2 correct – ½ mark

c. When the m-RNA is changed from UAU to UAA, it means a stop codon is in place instead of a codon coding for the amino acid tyrosine. With a stop codon in place, the polypeptide synthesis ceases because no amino acids will form peptide bonds with each other after the stop codon. (1).

d. A mutation is a sudden random change in the genetic material (genotype) of an organism. Mutations can involve single bases, segments of a chromosome or whole chromosomes. (1).

e. The information contained in m-RNA in the form of codons (a 3 base sequence) came from a DNA template strand. To make this m-RNA (transcription), nucleotides are added in the same sequence as that found on the DNA template strands according to complementary base pairing, with uracil replacing thymine in m-RNA. (1).

Question 4.

a. The human genome refers to the position of all the genes and DNA that are found in a human being. (1).

b. Genetic engineering may involve the transfer of DNA from one species to another species and scientists need a mechanism to transport DNA between different species. In order to transport a piece of DNA from one organism into the cells of another organism scientists use a vector. (1).

c. Plasmid or virus. (1).

d. More copies of a strand of DNA can be made artificially by the technique called polymerase chain reaction (1). The original piece of DNA is heated to separate it into two single strands. Each of the two single strands then undergo complementary base pairing to form copies of the original strand. The process is repeated many times so that many copies of the original DNA are made. (1).

e. An enzyme known as reverse transcriptase is used to make a complementary single strand of DNA based on the original RNA. The single strand of DNA, called copy DNA, separates from the RNA. Then due to complementary base pairing, the copy DNA becomes a double stranded DNA molecule. (1).

Question 5.

a. When there is no longer a living individual of a particular species in the wild or in captivity it means that particular species is extinct. Extinction is the disappearance of all living individuals of a particular species. (1).

b. Pentadactyl limb (1).

c. Disagree with the student because the structural similarity of limbs between different species of carnivores is due to their having common ancestry (1). Although the limbs may perform different functions and look different, their structural similarity is due their descent from a common ancestor which means the structures are homologous and not analogous (1).

d. At some stage in the distant past the common ancestor of the two species of cat would have separated into two populations that were isolated from each other and unable to interbreed (1). Over a long period of time these two isolated populations would have been subjected to different selection pressures as well as mutations, and developed characteristics suitable to their particular environment. When they were unable to interbreed and produce fertile offspring, then they became two separate species (1).

e. The fossil record of carnivores is incomplete because not every carnivore that dies becomes a fossil; geological activity destroys many carnivore fossils and not every carnivore that exists as a fossil has been discovered (1).
f. The presence of sharp, long teeth (incisors and canines) in the jaw would indicate that the fossil is a carnivore (1).

Question 6.

a. Convergent evolution (1).
b. For living organisms that reproduce sexually, species is defined as individuals that interbreed under natural conditions to produce fertile offspring. If there is no interbreeding or sterile offspring produced, then the breeding individuals were members of different species (1). However, with similar looking fossil specimens it is difficult to decide if they are the same or different species; since interbreeding is not possible. Just because fossil specimens look similar does not mean they belong to the same species. They can in fact be completely unrelated and different species. Even living organisms that look similar can be different species. (1).
c. Selection pressure indicates how much intensity particular traits that organisms possess are subjected to by natural selection. When natural selection favours (positive selection pressure) or does not favour (negative selection pressure) a trait, then the organism will, respectively, either benefit or be disadvantaged. (1).
d. DNA hybridization is a technique that uses DNA from a particular position to determine the similarity or highlight differences between different species. Obtaining single strands of DNA from each of the four species in turn, and then putting two single DNA strands from different species together, the scientists can measure the amount of complementary base pairing between the two single DNA strands.(1). In the case of these four species there was not much complementary base pairing so they are not closely related (1).

Question 7.

a. Palaeontologists find it difficult to agree on how humans evolved since no other species associated with human evolution such as *Australopithecus* and *Homo* are alive. It is not possible to be certain which members of the hominid family are part of our evolution if the only evidence is from fossil skulls and bones. (1).
b. Bipedalism (1).
c. As humans evolved and our walk became progressively more upright, the position of the foramen magnum moved from the rear on the underside of the skull towards the centre on the underside of the skull. In modern humans, the foramen magnum is positioned near the centre on the underside of the skull. (1).
d. Africa (1).

Question 8.

a. Cultural evolution is the rapid transfer, between individuals of the same or different generations, of non-genetic information such as ideas, learnt behaviour, values and technology. This can change individuals during their lifetime and also change whole societies.(1).

b. Genetic screening is the testing of individuals to see if they have any genetic disorders that could lead to complications during their own lifetime or if they have children (1). If individuals with these genetic disorders are identified early enough, they can be treated for the disorder and have a better chance of survival. Therefore, more and more individuals with these genetic disorders will survive with the result that these genetic disorders could become more and more common in the human gene pool (1).

c. The cloning of endangered species means that individuals that are made by cloning will be genetically identical to one another. This will result in their genetic diversity decreasing and there will not be as much genetic variability between members of the endangered species (1).

d. Selective breeding is when humans decide which traits are desirable to have in individuals of a particular species, even if these traits disadvantage the individual's chances of survival under natural selection. Those individuals with disadvantageous traits are unlikely to survive because they will be selected against by natural selection. (1).