



VCE BIOLOGY 2010

YEAR 12 TRIAL EXAM UNIT 4

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Time allowed: 90 minutes

Total marks: 75

25 Multiple Choice Questions

8 Short Answer Questions

An Answer Sheet is provided for Section A.

Answer all questions in Section B in the space provided.

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Student Name.....

VCE Biology 2010 Year 12 Trial Exam Unit 4

Student Answer Sheet

Instructions for completing test. Use only a 2B pencil. If you make a mistake erase and enter the correct answer. Marks will not be deducted for incorrect answers.

Write your answers to the Short Answer Section in the space provided directly below the question. There are 25 Multiple Choice questions to be answered by circling the correct letter in the table below.

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

VCE Biology 2010 Year 12 Trial Exam Unit 4

Multiple Choice Questions – Section A

Question 1

Figure 1 below is a diagrammatic representation of a pair of homologous chromosomes during meiosis, showing four genes found in a particular individual.

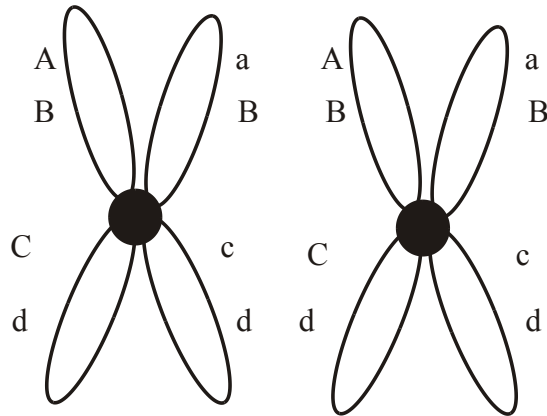


Figure 1

Which one of the following represents a gamete that could not be produced by this individual?

- A. ABCd.
- B. aBCd.
- C. AbCD.
- D. aBcd.

Question 2

When there are more than two alleles for a particular gene locus in a population, the gene locus can be described as being

- A. polygenic.
- B. multiple allelic.
- C. polymorphic.
- D. polyphyletic.

Question 3

The component of DNA that is transcribed but not translated is the

- A. intron.
- B. template.
- C. exon.
- D. promoter.

Use the following information to answer Questions 4 and 5.

Figure 2 below is a pedigree that shows a pattern of inheritance for a particular genetic condition that is found among humans. Shaded individuals have the genetic condition.

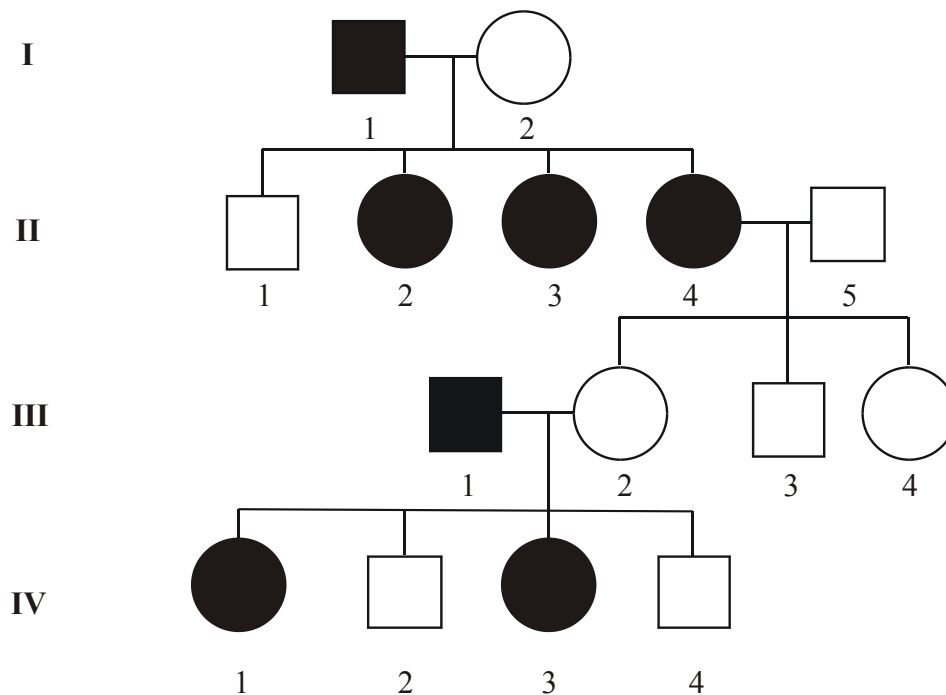


Figure 2

Question 4

Which one of the following best describes the pattern of inheritance in **Figure 2**?

- A. Sex-linked recessive.
- B. Autosomal recessive.
- C. Autosomal dominant.
- D. Sex-linked dominant.

Question 5

If individual **IV-4** who does not have the genetic condition decides to have children with a female partner whose father but not mother had the genetic disorder, what is the chance that any one of their daughters could have the genetic condition?

- A. $\frac{3}{4}$
- B. $\frac{1}{2}$
- C. $\frac{1}{3}$
- D. $\frac{1}{4}$

Question 6

GGC is the anti-codon that is needed for glycine to become part of a polypeptide. Therefore it is correct to say that the

- A. codon CCU will match up with the anti-codon GGC.
- B. template strand on the DNA molecule that codes for glycine would be CCG.
- C. anti-codon GGC can be used for amino acids other than glycine.
- D. amino acid glycine may have other anti-codons that enable it to become part of a polypeptide.

Question 7

In a DNA molecule the number of

- A. uracil nucleotides equals the number of thymine nucleotides.
- B. ribose sugar molecules is twice the number of phosphate groups.
- C. thymine and adenine nucleotides equals the number of guanine and cytosine nucleotides.
- D. nitrogen-containing bases equals the number of phosphate groups.

Question 8

Figure 3 below represents a piece of DNA and the cutting sites for three restriction enzymes, *Pst* I, *Hap* II and *Not* I.



Figure 3

From the information provided in **Figure 3** above, one could conclude that using

- A. *Not* I would produce three pieces of DNA.
- B. *Hap* II would produce two pieces of DNA.
- C. *Pst* I would produce four pieces of DNA.
- D. *Pst* I and *Not* I would produce six pieces of DNA.

Use the following information to answer Question 9.

Figure 4 below shows the distribution of phenotypes for two different inherited characteristics, **A** and **B**.

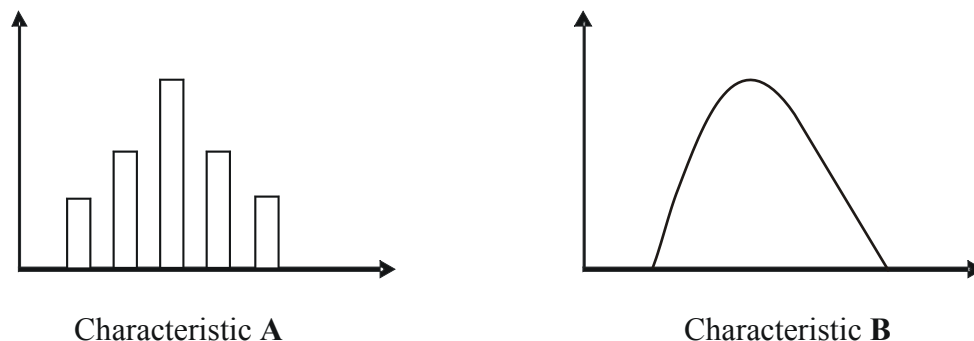


Figure 4

Question 9

From the information in **Figure 4** and your own knowledge of genetics, one could conclude that characteristic **A** is the result of

- A. block mutations and characteristic **B** is the result point mutations.
- B. multiple alleles and characteristic **B** is the result of polygenes.
- C. incomplete dominance and characteristic **B** is the result of co-dominance.
- D. polymorphism and characteristic **B** is the result of dimorphism.

Use the following information to answer Question 10.

In watermelons, the allele for spotted colour (**S**) is dominant to solid colour (**s**), while the allele for bitter fruit (**B**) is dominant to sweet fruit (**b**). These two genes are found on different chromosomes.

Question 10

In a test cross that was carried out on watermelons that were heterozygous at both these gene loci, one could expect that the results of this test cross would show that

- A. all the watermelons would be spotted and have bitter fruit.
- B. three quarters of the watermelons would be spotted and have bitter fruit.
- C. half of the watermelons would be spotted and have bitter fruit and the other half would have a solid colour and sweet fruit.
- D. there would be watermelons with four different phenotypes and genotypes in equal proportions.

Use the following information to answer Questions 11 and 12.

The colour of hair found on certain parts of the body of a particular species of dog is under the control of a gene that has the following alleles **A** (white colour) and **a** (sable colour).

Question 11

If two dogs with the genotype **AA** and **aa** are mated, what percentage of any offspring would have the sable colour?

- A. 100%
- B. 50%
- C. 25%
- D. 0%

Question 12

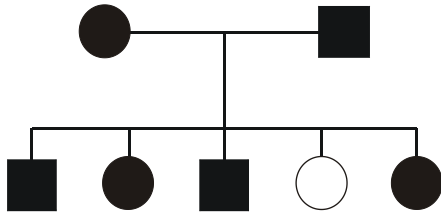
The resultant genotypes of a litter of pups from a mating of dogs that are **Aa** and **aa** could be

- A. **AA**, **Aa** and **aa**
- B. **Aa** and **aa**
- C. **AA** and **aa**
- D. cannot be determined from the information in the data.

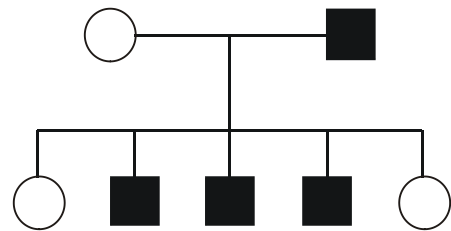
Question 13

Which one of the following pedigrees most likely represents a sex linked recessive pattern of inheritance? Shaded individuals have the trait.

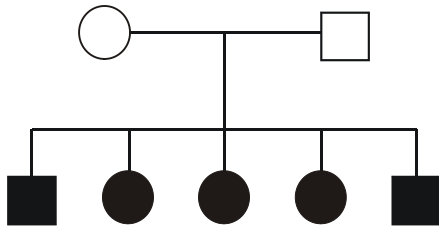
A.



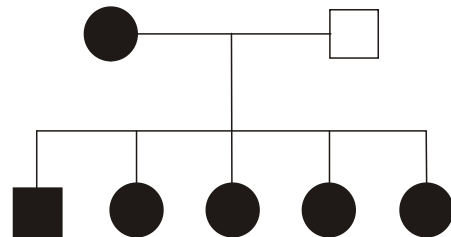
B.



C.



D.



Use the following information to answer Question 14.

Figure 5 represents the DNA profile of an individual.

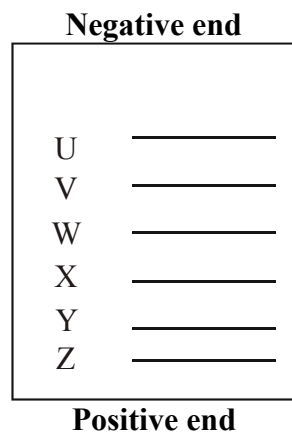


Figure 5

Question 14

From the information provided in **Figure 5**, one could reasonably conclude that

- A. fragments Y and Z are larger than U and V.
- B. fragment Z has moved the furthest because it has the most base pairs.
- C. fragment X is smaller than V, but larger than U and W.
- D. fragment W is smaller than U and V, but larger than X and Y.

Question 15

Different combinations of alleles that arise on homologous chromosomes are the result of

- A. selection.
- B. crossing-over.
- C. mutation.
- D. independent assortment.

Question 16

Alleles for any recessive disorder within a species could be eliminated completely from that species in a very short time if

- A. only homozygous dominant individuals within the species are allowed to breed.
- B. there is an increase in interbreeding between different populations of the species.
- C. homozygous recessive individuals within the species are prevented from breeding.
- D. only heterozygous individuals within the species are prevented from breeding.

Question 17

Which one of the following is a major reason why bacteria can evolve quite quickly as they respond to changes in their environment? Bacteria have

- A. a much higher rate of mutation than multicellular organisms.
- B. a circular chromosome called a plasmid that can be changed quite quickly.
- C. no nucleus, which means that the DNA content in the cytoplasm can be changed quite quickly when the environment changes.
- D. a short generation time, so that any changes in their DNA can become widespread quite quickly within a particular population or species of bacteria.

Question 18

Which one of the following biological terms is used by palaeontologists as evidence of evolution, and links the present day distribution of living species with related fossil species that are now extinct?

- A. Biodiversity.
- B. Biogeography.
- C. Biogenesis.
- D. Biochemical evolution.

Question 19

Fossilised specimens of soft bodied organisms are not commonly found since

- A. they are only found in environments where being buried by sediments does not occur.
- B. their remains have been destroyed as a result of earth movements and lava flow.
- C. there is a lack of hard parts in the structure of these organisms.
- D. they are not present in as large numbers as those organisms composed of an exoskeleton or endoskeleton.

Question 20

Figure 6 below is a cladogram that shows the evolutionary relationship between seven different species of wallabies in Australia and their ancestral form **X**.

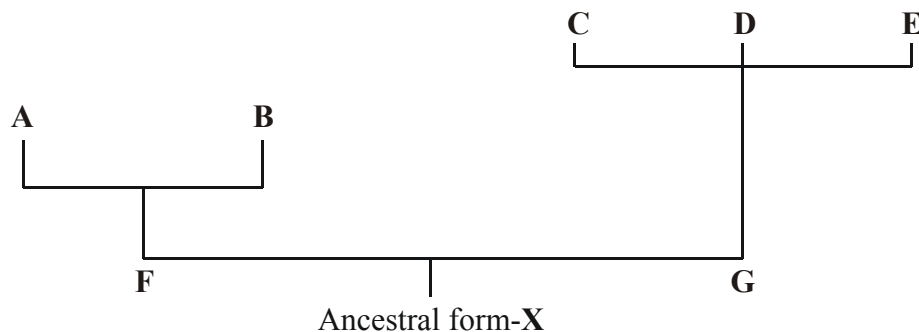


Figure 6

From the cladogram in **Figure 6**, one could conclude that

- A. ancestral form **X** is the most recent common ancestor of wallaby species **C**, **D** and **E**.
- B. species **G** is the common ancestor of species **A**, **B**, **C**, **D** and **E**.
- C. the evolution of the seven wallaby species from their ancestral form-**X** is an example of adaptive convergence.
- D. species **F** is the most recent common ancestor of species **A** and **B**.

Question 21

Which one of the following statements would biologists use to determine whether two living populations, that are very similar in their physical appearance, are actually the same species?

The two populations

- A. live in the same environment and are not separated by any physical barriers.
- B. interbreed in their natural surroundings, resulting in fertile offspring.
- C. have physical characteristics which are very similar due to their close proximity to each other and because they live in similar environments.
- D. must be the same species since both populations have survived the process of natural selection.

Question 22

As a result of using antibiotics, there has been an increase in the number of bacteria which have become resistant to antibiotics. Which one of the following statements best explains this increase in resistance to antibiotics by bacteria?

- A. Resistance to antibiotics is inherited and there has been strong positive selection pressure for this resistant trait in bacteria.
- B. The use of antibiotics has caused mutations in bacteria which made them resistant to the antibiotics.
- C. Resistance to antibiotics developed in bacteria after the bacteria had been exposed to the antibiotics.
- D. Resistance developed in bacteria due to intense competition between different species, as they became better adapted to an environment containing antibiotics.

Question 23

In order to find out the absolute age of rocks and fossils, radioisotopes are used. Uranium-235 is a radioisotope which decays to lead-207 and has a half-life of 700 million years. A rock containing a very primitive fossilised organism was found to have an absolute age of 2800 million years. What percentage of the original uranium-235 would still be present in the rock?

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

Question 24

Which one of the following combination of processes, in sexually reproducing species, would show how a new allele of a particular gene originates, and how this new allele could increase in frequency?

- A. Natural selection and speciation.
- B. Mutation and natural selection.
- C. Speciation and recombination.
- D. Reproductive isolation and mutation.

Question 25

Fossil skulls from the genus *Australopithecus* differ from the fossil skulls of the genus *Homo*, in that, compared to the genus *Homo*, the genus *Australopithecus* has a

- A. larger braincase and a smaller jaw.
- B. smaller jaw and a more sloping face.
- C. larger jaw and a smaller braincase.
- D. flatter face and a larger jaw.

End of Section A

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Short Answer Questions – Section B

Question 1

The pedigree in **Figure 7** shows the inheritance of a genetic condition that is controlled by a particular gene in humans. Individuals with the genetic condition are shaded.

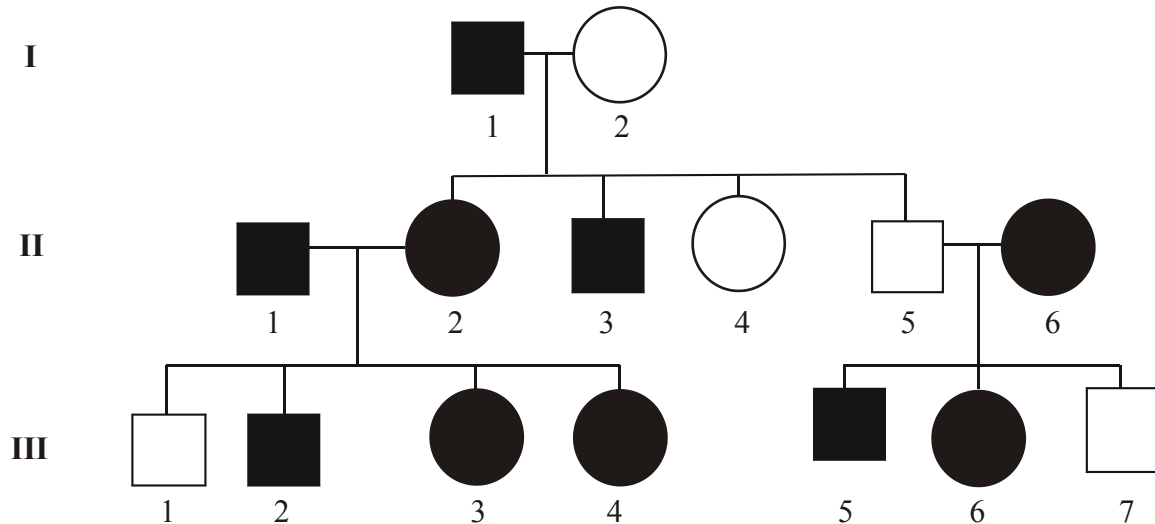


Figure 7

- a. How is the genetic condition shown in the pedigree most likely inherited?

(1 mark)

- b. Individual **I-1** had a father who was homozygous for the genetic condition and his mother did not have the genetic condition. What was the chance that individual **I-1** inherits the condition and is heterozygous?

(1 mark)

- c. Briefly explain your answer to **1b**. Use the letters **A** and **a**.

(2 marks)

- d. Using the letters **A** or **a** write down the genotype of individual **III-4**. Explain.

(2 marks)

- e. If individual **III-6**, who is heterozygous for the genetic condition, decides to have children, what must be the genotype of her partner so that there is a fifty per cent chance that their children will inherit the genetic condition?

(1 mark)

Total marks = 7 marks

Question 2

Wildlife officers suspected a man, who was a licensed breeder for a particular species of endangered parrot, of capturing four of these parrots (**A**, **B**, **C** and **D**) from the wild rather than breeding them. They decided to analyse the DNA of the four parrots and the man's breeding pair of parrots. **Figure 8** shows the results and DNA profiles of the six parrots.

Individual Parrots				Breeding Pair	
Parrot A	Parrot B	Parrot C	Parrot D	Male parrot	Female parrot

Figure 8

- a. From the results of the DNA profiles which parrot or parrots (**A**, **B**, **C** or **D**), if any, could have resulted from the breeding pair of parrots?

(1 mark)

- b. Briefly explain your answer to question **2a**.

(1 mark)

- c. By looking at the DNA profiles in **Figure 8**, could any of the four parrots (**A**, **B**, **C** or **D**) be related to each other? Explain.

(2 marks)

- d. Name and explain the technique that is used by geneticists to separate a mixture of DNA fragments.

(2 marks)

- e. What biological term is given to the position where a particular type of enzyme can cut a DNA molecule?

(1 mark)

Total marks = 7 marks

Question 3

The diagrammatic representation in **Figure 9** shows an important biological process that occurs within the cells of living organisms.

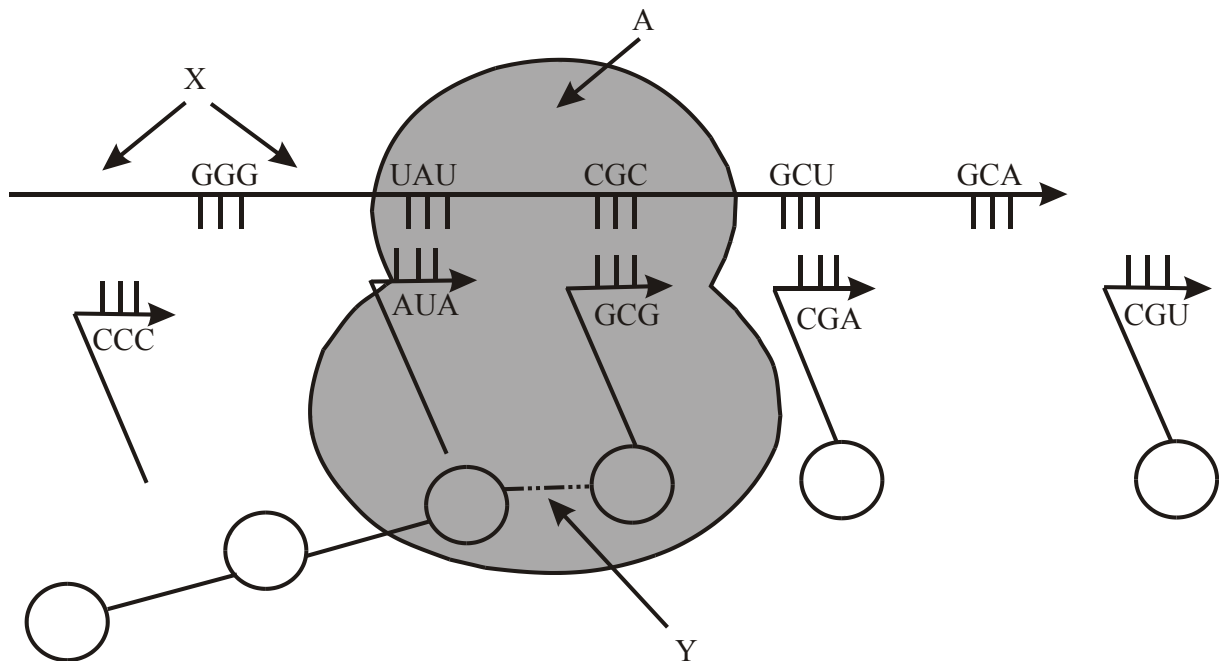


Figure 9

- a. Name the biological process that is diagrammatically represented in **Figure 9**.

_____ (1 mark)

- b. Name and explain the process that results in the molecular structure labelled **X** in **Figure 9**.

_____ (2 marks)

- c. Which specific organelle in the cell does the type of RNA that partly makes up structure **A** come from?

_____ (1 mark)

Use the table below to answer parts *d* and *e* of Question 3.

m-RNA codons that code for particular amino acids							
CUU	Leucine	GUU	Valine	CGU	Arginine	UAU	Tyrosine
CUC	Leucine	GUC	Valine	CGC	Arginine	UAC	Tyrosine
CUA	Leucine	GAA	Glutamic acid	CGA	Arginine	UAA	Stop
CUG	Leucine	GAG	Glutamic acid	CGG	Arginine	UAG	Stop
AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	UGU	Cysteine
AUC	Isoleucine	ACC	Threonine	AAC	Asparagine	UGC	Cysteine
AUA	Isoleucine	ACA	Threonine	AAA	Lysine	UGA	Stop
AUG	Methionine	ACG	Threonine	AAG	Lysine	UGG	Tryptophan

The DNA sequence **ATGAAATTCCAGTCGTAT....** represents a portion of a code for a gene.

- d. Assuming that there is only one point mutation at the 9th base to **T**, if one starts counting from the left hand side of the DNA sequence, explain whether this will result in any changes to the product that can be formed from this gene.

(2 marks)

- e. What would be the consequences if the 3rd base, if one starts counting from the left hand side of the DNA sequence, is changed to **T**?

(1 mark)

- f. Name the type of bond that forms at **Y**.

(1 mark)

Total marks = 8 marks

Question 4

Figure 10 is a diagrammatic representation of a plasmid, a circular piece of DNA found in bacteria. A plasmid can be used to transfer genes from one species to another. In this case two foreign genes, **A** and **B**, have been inserted into a plasmid which was removed from bacteria. As well, an **antibiotic resistant gene** has been included in the plasmid. This plasmid was then put back into the bacteria.

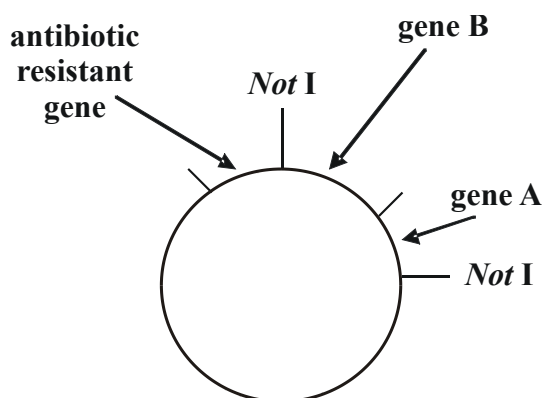


Figure 10

- a. What is used by scientists to cut the DNA of a plasmid?

(1 mark)

- b. Write down the names of the cut ends of a DNA molecule. Firstly, when the cut is made directly opposite each of the two complementary DNA strands. Secondly, when the cut is made on a DNA strand at one point and at a different point on the complementary DNA strand.

(1 mark)

- c. Why is it important to have an **antibiotic resistant gene** included with the foreign genes **A** and **B**?

(2 marks)

- d. If *Not* I was used to cut the recombinant plasmid, how many DNA fragments would result?

(1 mark)

Total marks = 5 marks

Question 5

Warfarin is a pesticide that can be used against mice and rats. Initially, warfarin was successful in controlling and reducing mice and rat populations. However, warfarin is no longer as effective in controlling mice and rat populations. Now the highly lethal pesticide Brodifacoum is used more widely to control and reduce mice and rat populations.

- a. Name the process that initially led to a reduction in mice and rat populations.

(1 mark)

- b. Explain why the populations of mice and rats were initially reduced by warfarin, but now warfarin is not as effective in controlling these populations.

(2 marks)

- c. What selective agent is now more effective in controlling mice and rat populations?

(1 mark)

Not only habitat destruction and small populations, but lack of genetic variation can also increase the risk of species becoming extinct.

- d. Explain why a lack of genetic variation can increase the risk of species becoming extinct.

(2 marks)

- e. How does a new genetic variation arise within a species?

(1 mark)

- f. Small populations do not have a large gene pool. Briefly explain the biological term *gene pool*.

(1 mark)

Total marks = 8 marks

Question 6

The presence of fossils in sedimentary rocks is used by palaeontologists as evidence to support the theory of evolution.

- a. Why are fossils mainly found in sedimentary rocks? Explain.

(1 mark)

- b. Explain why fossilised pollen, that is millions of years old, can be used as evidence that plants also existed millions of years ago.

(1 mark)

- c. Briefly explain the meaning of the biological term *selective pressure*.

(1 mark)

- d. Name the method that would be used to determine the definite age for a 100 million year old fossilised fish.

(1 mark)

Total marks = 4 marks

Question 7

Figure 11 is a cladogram that below shows the evolutionary relationship between eight different species of mammals (S, T, U, V, W, X, Y and Z).

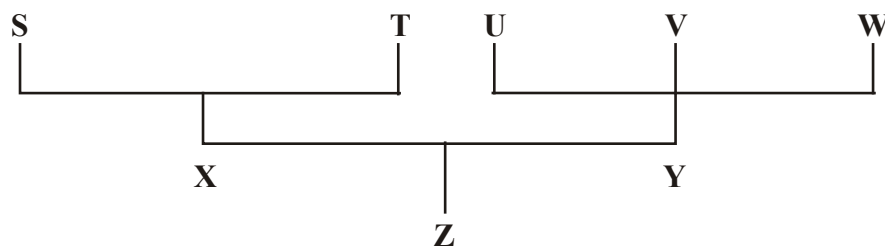


Figure 11

- a. Name the type of evolution that is illustrated in **Figure 11**.

(1 mark)

- b. A limb found in these eight mammals and based on five digits is called a pentadactyl limb. Is the pentadactyl limb in these eight mammals an example of a homologous structure? Explain.

(2 marks)

- c. Explain how DNA hybridisation can determine whether species **U** and **V** or species **V** and **W** are more closely related. All three species are still in existence today.

(2 marks)

- d. Scientists have suggested that species **S** and **T** evolved from species **X**. Briefly explain how geographic isolation could have led to the evolution of species **S** and **T** from species **X**.

(2 marks)

Total marks = 7 marks

Question 8

The biological evolution of humans over many millions of years by natural selection, brought about changes in our anatomy and structure. However, in the last ten thousand years, cultural evolution has brought about more changes in humans than biological evolution.

- a. Briefly explain how the position of the foramen magnum at the base of the skull in apes differs from humans.

(1 mark)

- b. Name the biological term that is used to describe movement in humans, that is associated with the position of the foramen magnum at the base of the skull in humans.

(1 mark)

- c. Briefly state how leg length relative to arm length differs in modern living apes compared to *Homo sapiens*.

(1 mark)

- d. What is the most significant difference between biological and cultural evolution?

(1 mark)

Total marks = 4 marks

End of Section B

End of Trial Exam

Suggested Answers

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Multiple Choice Answers – Section A

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

Short Answer Questions (Answers) – Section B

Question 1

- Autosomal dominant **(1 mark)**.
- 100% **(1 mark)**.
- Father – homozygous dominant – **AA**. Possible gametes - **A** or **A**. Mother – homozygous recessive – **aa**. Possible gametes – **a** or **a**. **(1 mark)**.
The only possible combination from these parents is **Aa**. Therefore the chance that individual **I-1** inherits the condition and is heterozygous is 100% **(1 mark)**.
- The genotype of individual **III-4** could be either **AA** or **Aa** **(1 mark)**. Both parents of individual **III-4** have the genetic condition, however one of their sons **III-1** does not, which means both his parents must be heterozygous for this genetic condition. This means **III-4** could be either homozygous (**AA**) or heterozygous (**Aa**) for this genetic condition **(1 mark)**.
- For there to be a fifty per cent chance that their children will inherit the genetic condition, the genotype of the partner of individual **III-6** must be **aa** **(1 mark)**.

Question 2

- Parrot **C** **(1 mark)**.
- Parrot **C** could have resulted from the breeding pair of parrots. The results from the DNA profiling clearly show that parrot **C** is the only parrot that has half of their DNA bands from the male parrot, while the other half of their DNA bands has come from the female parrot of the breeding pair **(1 mark)**.
- Parrots **B** and **D** **(1 mark)**. These two parrots could be related to each other. By looking at the DNA profiles of parrots **B** and **D** they clearly show that both these parrots have identical bands of DNA, which means parrots **B** and **D** must have had the same parents but not the breeding pair in **Figure 8** **(1 mark)**.
- Gel electrophoresis **(1 mark)**. This technique is used by geneticists to separate a mixture of DNA fragments. When DNA fragments are subjected to an electric current, the DNA fragments present, which are negative, move from the negative end to the positive end of the gel. Because the shorter fragments of DNA move further than the longer fragments in a given length of time, a mixture of DNA fragments can be separated in this way **(1 mark)**.
- Recognition sequence or cutting site **(1 mark)**.

Question 3

- a. Translation or polypeptide synthesis **(1 mark)**.
- b. Transcription is the process that results in the molecular structure labelled **X** **(1 mark)**. To begin with, RNA polymerase is used and the double-stranded DNA molecule unwinds to expose the bases of the template strand. The template strand is used to build a complementary copy of RNA, with uracil replacing thymine in the RNA. The sections of RNA that are transcribed from the introns are removed and only the sections of RNA transcribed from exons remain to form messenger RNA. Messenger RNA carries the codons and is the structure **X**, when it leaves the nucleus and attaches to the ribosome **(1 mark)**.
- c. Nucleolus **(1 mark)**.
- d. If there is a point mutation this means that base **C** has been changed to the base **T**. As a result, the codon on the messenger RNA will be AAA instead of AAG **(1 mark)**. However the codons AAA and AAG both code for the amino acid lysine. Since both codons code for lysine there will no changes to the product that will be formed from this gene as a consequence of the point mutation **(1 mark)**.
- e. If the base **G** is changed to **T** then the codon in messenger RNA will be UAA and not UAC. Since UAA is a stop codon while UAC is a codon for the amino acid tyrosine, the consequence of this change is that no amino acids will be combined to make the required product **(1 mark)**.
- f. Peptide bond **(1 mark)**.

Question 4

- a. Restriction enzyme or restriction endonuclease **(1 mark)**.
- b. Firstly, cut directly opposite – blunt end. Secondly, not cut directly opposite – sticky end. *Both answers have to be correct to get one mark* **(1 mark)**.
- c. It is be important to have an **antibiotic resistant gene** included with the foreign genes **A** and **B** because it is used to confirm that the bacteria have actually taken in the plasmid with the foreign genes **A** and **B** **(1 mark)**. The bacteria are grown on an antibiotic medium. Only those bacteria that have taken in the plasmid will be able to grow on this type of medium. Then, one can be sure that the foreign genes **A** and **B** have also been taken up by the bacteria **(1 mark)**.
- d. Two **(1 mark)**.

Question 5

- a. Natural selection **(1 mark)**.
- b. The populations of mice and rats were initially reduced by warfarin, because there were very few resistant rats and mice to warfarin in their populations. With the introduction of warfarin the non resistant rats and mice died and the numbers in each population dropped **(1 mark)**. But now warfarin is not as effective in controlling these populations because rats and mice resistant to warfarin survived to reproduce and passed on their resistance to subsequent generations, resulting in greater numbers of resistant rats and mice in their populations **(1 mark)**.
- c. Brodifacoum **(1 mark)**.

- d. A lack of genetic variation increases the risk of species becoming extinct because there is not as much genetic variability between members of the species if the environment the species lives in changes **(1 mark)**. As a result the species could lack the variability needed to survive and reproduce in the changed environment. This lack of variability would lead to the species' numbers decreasing, and over a period of time being unable to adapt, the species could become extinct **(1 mark)**.
- e. Mutation/s **(1 mark)**.
- f. Gene pool is the sum total of all the genes and the different alleles associated with these genes, that are present in all the individuals and populations, which make up a particular species **(1 mark)**.

Question 6

- a. Fossils are mainly found in sedimentary rocks because when an organism dies and is covered by sediments, there is less chance of decomposition or being eaten by scavengers. As a result, this increases the chance of fossilisation so that the organism becomes a fossil **(1 mark)**.
- b. Pollen is easily fossilised because pollen, due to its very tough outer wall, is highly resistant to decay. Since pollen is part of the reproductive cycle in plants, one can infer that plants existed in the past if fossilised pollen is found **(1 mark)**.
- c. Selection pressure refers to how great the intensity is on an organism having a specific feature or trait to survive in its environment. If the trait is advantageous, it has a positive effect on the organism's survival, but if the trait is disadvantageous it has a negative effect on the organism's survival **(1 mark)**.
- d. Radioisotope dating or absolute dating **(1 mark)**.

Question 7

- a. Divergent evolution or adaptive radiation **(1 mark)**.
- b. The pentadactyl limb in these eight mammals is an example of a homologous structure **(1 mark)**. Since all the mammals evolved from a common ancestor, species **Z**, the bones that make up a pentadactyl limb would all have the same basic design. However, the basic design would have been modified in these different mammals according to the function that the pentadactyl limb has to perform **(1 mark)**.
- c. DNA hybridisation can determine whether species **U** and **V** or species **V** and **W** are more closely related by taking a single strand of DNA from species **U** and **W**. Then mixing these single DNA strands with a single strand of DNA from species **V** so that the DNA can hybridise and become double stranded **(1 mark)**. If the extent of DNA base pairing is greater between **U** and **V** than **V** and **W**, then **U** and **V** are more closely related. Similarly if DNA base pairing is greater between **V** and **W** than **U** and **V**, then **V** and **W** are more closely related **(1 mark)**.
- d. Geographic isolation of two populations of species **X**, over a long period of time, would have meant that they experienced different mutations and been subjected to different selection pressures **(1 mark)**. These two isolated populations would have developed characteristics, as a result of their allele frequencies for their genes changing, suitable to their particular environment. When gene flow ceased and/or no more fertile offspring were produced, then these two populations became two separate species, **S** and **T** **(1 mark)**.

Question 8

- a. The position of the foramen magnum is towards the back, at the base of the skull, in apes. While in humans the foramen magnum is in the middle at the base of the skull **(1 mark)**.
- b. Bipedalism **(1 mark)**.
- c. The leg length relative to arm length differs in modern living apes compared to *Homo sapiens* in that the leg length relative to the arm length is shorter in modern apes compared to *Homo sapiens* **(1 mark)**.
- d. In cultural evolution information learnt during a lifetime can be passed from one generation to the next, and changes can occur in individuals during their lifetime experiences. However, in biological evolution information can only be passed from one generation to the next through what is present in the genes **(1 mark)**.

End of Suggested Answers