PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 3: GENETICS (PACK 3)

SCORE	PERCENTAGE
/35	%

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Q1.

Figure 1 shows part of a DNA molecule.

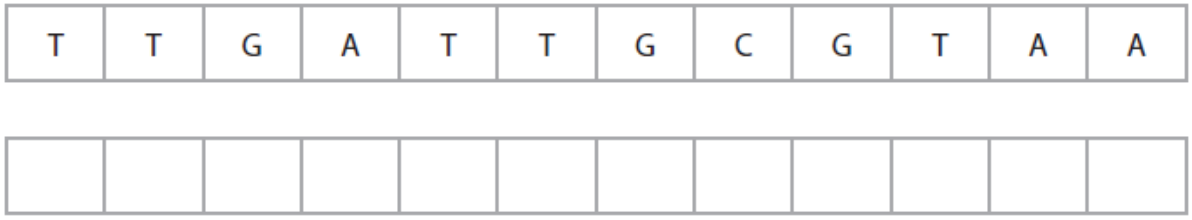


Figure 1

(i) Write the code for the complementary DNA strand in Figure 1.

(2)

(ii) Three bases code for each amino acid.

Which is the maximum number of amino acids coded for by this strand of DNA?

(1)

☒ **A** 3

☒ **B** 4

☒ **C** 6

☒ **D** 12

(iii) What is the shape of a DNA molecule?

(1)

☒ **A** triple stranded

☒ **B** single stranded

☒ **C** single helix

☒ **D** double helix

(Total for question = 4 marks)

Q2.

There are four blood groups: A, B, AB and O.

Explain why males are more likely than females to have a sex-linked genetic disorder such as haemophilia.

(3)

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(Total for question = 3 marks)

Q3.

Gregor Mendel studied inheritance in pea plants.

Pea plants can produce either yellow pea pods or green pea pods.

Mendel crossed plants that always produce yellow pea pods with plants that always produce green pea pods.

Symbol **A** represents the dominant allele.

Symbol **a** represents the recessive allele.

Which is the genotype of the pea pods produced from this cross?

(1)

- ☒ **A AA**
- ☒ **B aa**
- ☒ **C Aa**
- ☒ **D YG**

(Total for question = 1 mark)

Q4.

The dodo was a flightless bird which is now extinct.

The photograph shows the skeleton of a dodo.



(a) (i) Explain why the dodo was placed in the kingdom Animalia.

(2)

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(ii) The dodo was classified as a chordate.

Using the information in the photograph, explain why scientists classified the dodo into the phylum Chordata.

(1)

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(iii) The binomial name for the dodo is *Raphus cucullatus*.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The name *Raphus* refers to the dodo's

(1)

☒ **A** family

☒ **B** genus

☒ **C** order

☒ **D** phylum

(b) The dodo lived on the small island of Mauritius. It became extinct in 1681.

Using your knowledge of natural selection, suggest why the dodo may have become extinct.

(3)

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(c) Complete the sentence by putting a cross (☒) in the box next to your answer.

The formation of a new species due to geographical isolation is called

(1)

☒ **A** adaptation

☒ **B** competition

☒ **C** hybridisation

☒ **D** speciation

(d) Describe the causes of variation in a population.

(2)

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(Total for Question = 10 marks)

Q5.

The enzyme proteinase K is used to extract DNA from skin cells.

(i) Explain why proteinase K is used to extract DNA from skin cells.

(2)

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(ii) Describe the safety precautions that should be used when handling human tissue in a laboratory.

(3)

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(iii) Proteinase K is usually stored at 4 °C.

Figure 10 shows the effect of storage temperature on the activity of proteinase K.

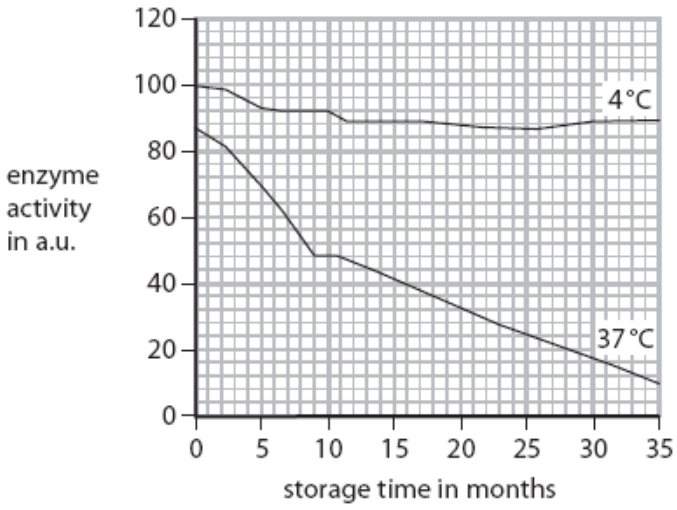


Figure 10

Explain how the activity of proteinase K changes when stored at 37 °C.

(2)

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(Total for question = 7 marks)

Q6.

Duchenne muscular dystrophy is a sex-linked recessive genetic disorder caused by a mutation on a single gene on the X-chromosome.

The letter D can be used for the dominant allele and the letter d for the recessive allele.

Figure 5 shows the inheritance of Duchenne muscular dystrophy in a family.

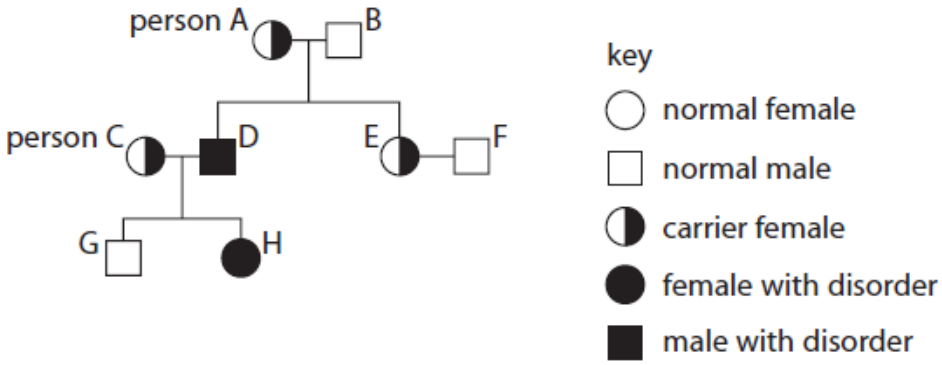


Figure 5

(i) What is the percentage chance of any child from person A inheriting the mutated allele?

(1)

☒ **A** 0%

☒ **B** 25%

☒ **C** 50%

☒ **D** 75%

(ii) Explain the conclusion that can be made about the genotype of person C.

(2)

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(Total for question = 3 marks)

Q7.

* Describe the structure of DNA, including the roles of the scientists involved in its discovery.

(6)

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Q8.

Describe how a section of DNA determines the structure of a protein.

(4)

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Q9.

The enzyme proteinase K is used to extract DNA from skin cells.

Proteinase K is produced during protein synthesis.

Describe how the gene coding for proteinase K is transcribed to produce a strand of mRNA.

(3)

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(Total for question = 3 marks)

Q10.

The bonds joining the two strands of a DNA molecule together are

(1)

- ☒ **A** weak peptide bonds
- ☒ **B** strong peptide bonds
- ☒ **C** weak hydrogen bonds
- ☒ **D** strong hydrogen bonds

(Total for question = 1 mark)

Q11.

A student used the method shown in Figure 3 to compare the mass of DNA extracted from strawberry fruit cells and from kiwi fruit cells.

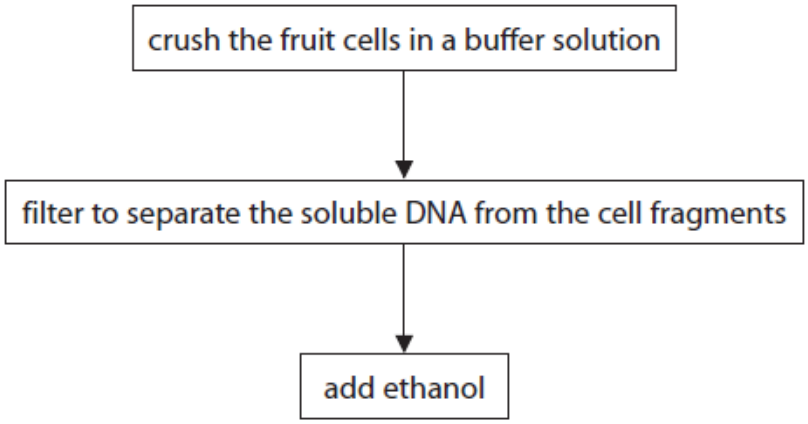


Figure 3

(i) State why ethanol is used.

(1)

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(ii) State **two** variables the student needs to control when using this method to compare the mass of DNA from these two fruits.

(2)

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2 .....

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(iii) The student repeated the experiment.

Give **one** reason why.

(1)

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(Total for question = 4 marks)

Q12.

Huntington's disease is a genetic disorder.
Huntington's disease is caused by a dominant allele (H).

Figure 6 shows the inheritance of Huntington's disease in a family.

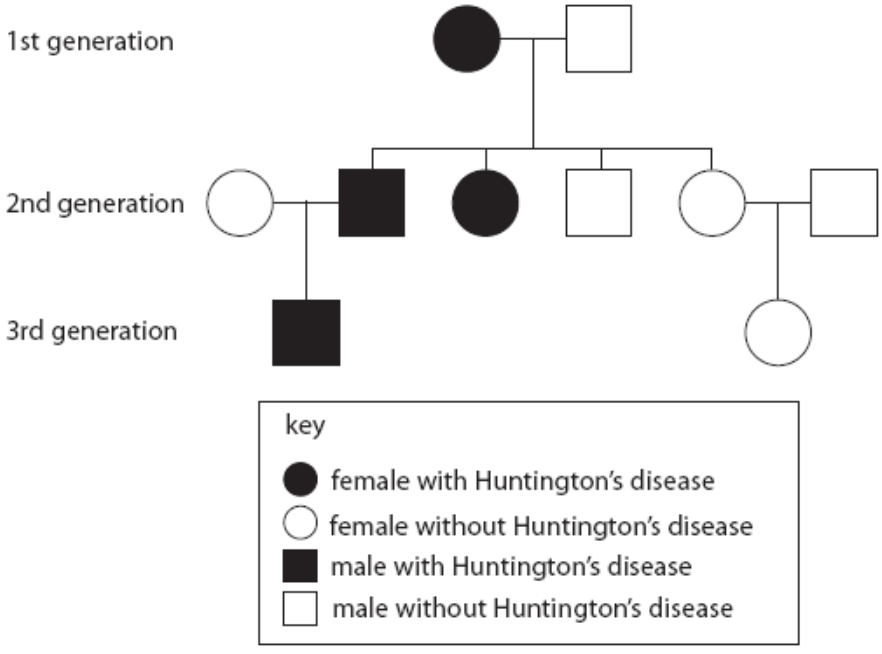


Figure 6

(i) State the genotype of the male in the 1st generation.

(1)

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(ii) It is possible for a female with Huntington's disease to have one of two genotypes.

State the two genotypes possible for a female with Huntington's disease.

(2)

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(iii) Explain which Huntington's disease genotype the female in the 1st generation must be.

(3)

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(Total for question = 6 marks)

Q13.

Duchenne muscular dystrophy is a recessive sex-linked genetic disorder. This disorder causes muscle weakness.

Figure 14 shows the inheritance of Duchenne muscular dystrophy in a family.

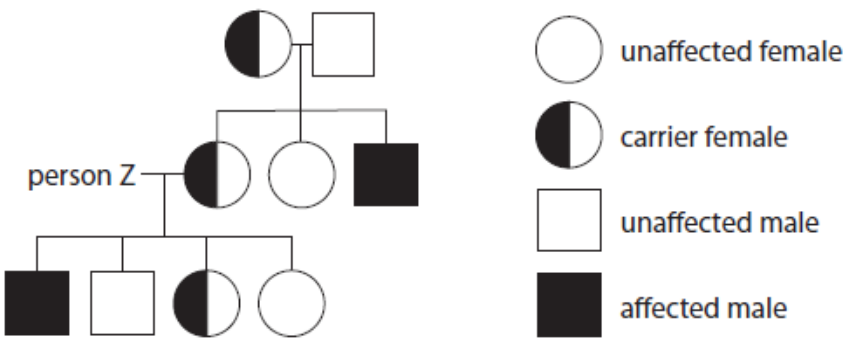


Figure 14

State and explain the phenotype of person Z.

(3)

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(Total for question = 3 marks)

Q14.

The images show a normal red blood cell and a red blood cell from someone who has sickle cell disease. Sickle cell disease is a genetic disorder caused by two recessive alleles.



Normal red blood cell



Red blood cell from someone who has sickle cell disease

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

An individual with sickle cell disease is said to be

(1)

☒ **A** a carrier for sickle cell disease

☒ **B** heterozygous

☒ **C** homozygous dominant

☒ **D** homozygous recessive

(ii) Describe the main symptoms of sickle cell disease.

(3)

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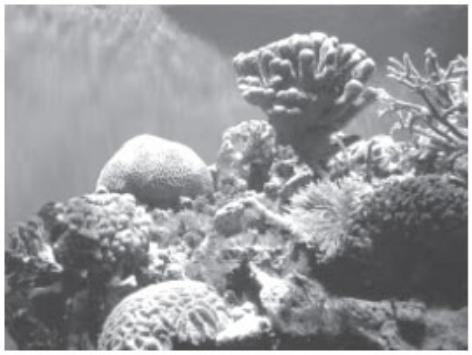
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Q15.

Corals are animals that live on the sea bed.

The photograph shows some species of coral.



(a) Corals can reproduce sexually, releasing sperm cells into the water.

The mass of DNA in one sperm cell from a species of coral is 0.5 picogram.

(i) Suggest the mass of DNA that would be present in an unfertilised egg cell of the same species.

(1)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The term used to describe the number of chromosomes in an egg or sperm cell is

(1)

☒ **A** diploid

☒ **B** gamete

☒ **C** haploid

☒ **D** zygote

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The base pairs in DNA are

(1)

☒ **A** thymine with adenine, cytosine with guanine

☒ **B** thymine with guanine, adenine with cytosine

☒ **C** uracil with adenine, guanine with cytosine

☒ **D** uracil with thymine, guanine with cytosine

(iv) Name the bond that joins the base pairs together.

(1)

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(b) After fertilisation, mitosis takes place to form an embryo.

The embryo develops into new coral.

(i) Describe mitosis.

(3)

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(ii) Describe how the embryo develops into new coral.

(3)

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(Total for Question = 10 marks)