Nucleotides & Nucleic Acids

Question Paper 2

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Foundations in Biology
Topic	Nucleotides & Nucleic Acids
Booklet	Question Paper 2

Time allowed: **49 minutes**

Score: **/36**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

The genetic code carries instructions for the synthesis of polypeptides.

(a) (i) State the number of DNA nucleotide bases that code for a single amino acid. **[1]**

(ii) There is a maximum of 64 different base combinations in DNA that could each code for an amino acid.

How is this number of combinations calculated? **[1]**

(iii) Twenty different amino acids are commonly used for protein synthesis. In theory, this would need only 20 different base combinations.

Explain the uses of the remaining 44 combinations. **[2]**

(iv) Which nucleotide bases are common to DNA and RNA? **[1]**

(b) Describe how a nucleotide base sequence in a gene is used to synthesise a polypeptide.

In your answer you should describe the steps of the process in the correct order.

[7]

[Total: 12]

Fig. 5.1 is a circular representation of the genetic code.

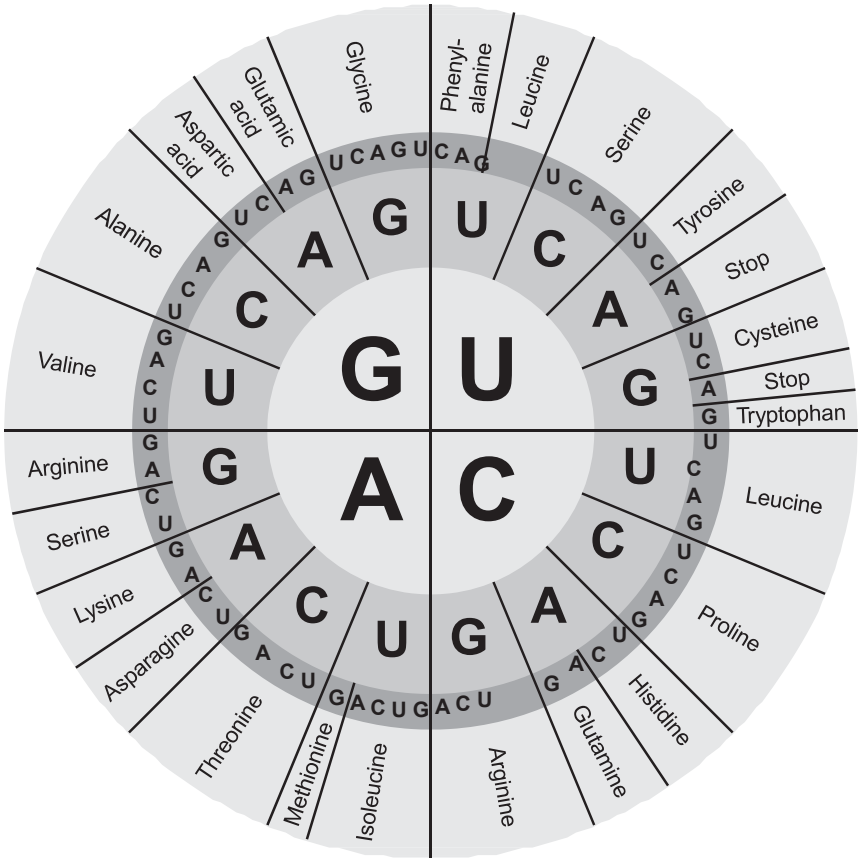

Fig. 5.1

(a) Fig. 5.2 shows a sequence of bases coding for a sequence of amino acids. The name of the third amino acid in the sequence has been filled in.

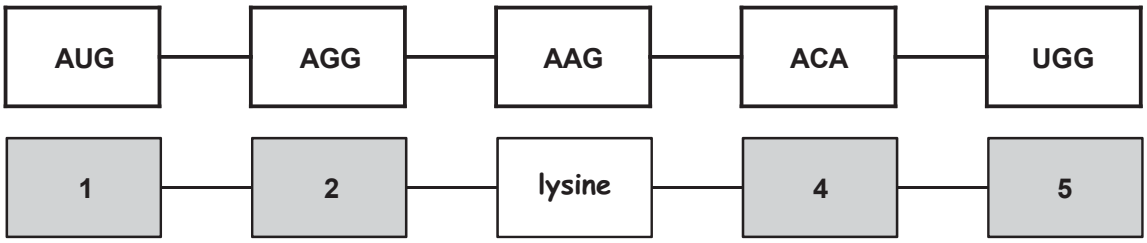

Fig. 5.2

Identify the remaining amino acids in the sequence. **[2]**

1 .....

2 .....

3 lysine

4 .....

5 .....

(b) State the name of the stage of protein synthesis represented in Fig.5.2 **and** name the organelle in the cell where this takes place.

[2]

(c) Identify the type of nucleic acid that holds the sequence of bases shown in Fig. 5.2. **[2]**

(d) Using the information in **Fig. 5.1**, list the **three** triplet codons that would cause termination of a polypeptide chain (stop codons) **and** explain why these codons have this effect.

[2]

(e) What name would be given to a mutation that resulted in a change of the codon **UUU** to **UUC**?

[1]

[Total: 9]

DNA and RNA are nucleic acids.

(a) (i) State the components of a **DNA** nucleotide. **[3]**

(ii) Describe how the structure of RNA differs from that of DNA. **[2]**

(b) Before a cell divides, the DNA needs to be accurately replicated.

Describe how a DNA molecule is replicated.

In your answer you should make clear how the steps in the process are sequenced.

[7]

(c) **(i)** State what a gene codes for. **[1]**

(ii) Suggest how changing the sequence of DNA nucleotides could affect the final product the DNA codes for. **[2]**

[Total: 15]