

## 8.2 The Triplet Code

# Objectives

- Understand the function and structure of the triplet code on DNA

## Success criteria

- Be able to answer verbal questions and three practice exam questions on the topic

# Starter – The Human Genome Project

- The largest biological experiment ever (started in the 1980s)
- Scientists discovered the full sequence of the human *genome* – 3,000,000 nucleotide bases
- This gives scientists info on how our bodies develop and how things go wrong
- **In pairs:** If you could find out information about your future life span and health from your genome, what do you think would be useful to know and what would you want or not want to know? **Write down at least 5 comments.**

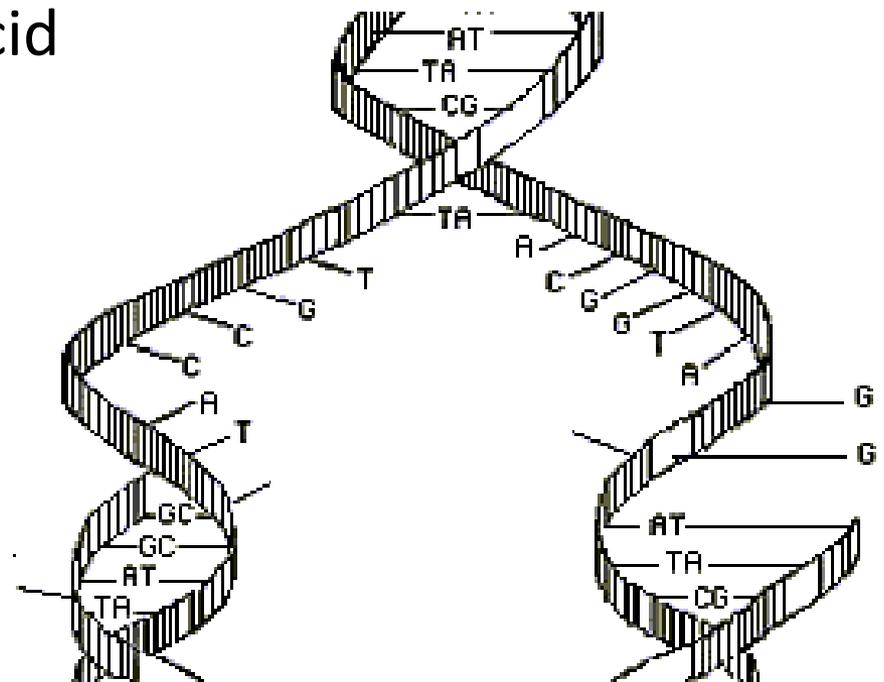
# Making proteins from DNA

- Before making a protein, the information in the DNA has to get into the cytoplasm of the cell – this is where proteins are made
- The DNA unwinds
- The unwound, single strand is then copied
- and the copy is transported out of the nucleus into the cytoplasm by **messenger RNA (mRNA)** where proteins are made

# The sequence of bases code for amino acids

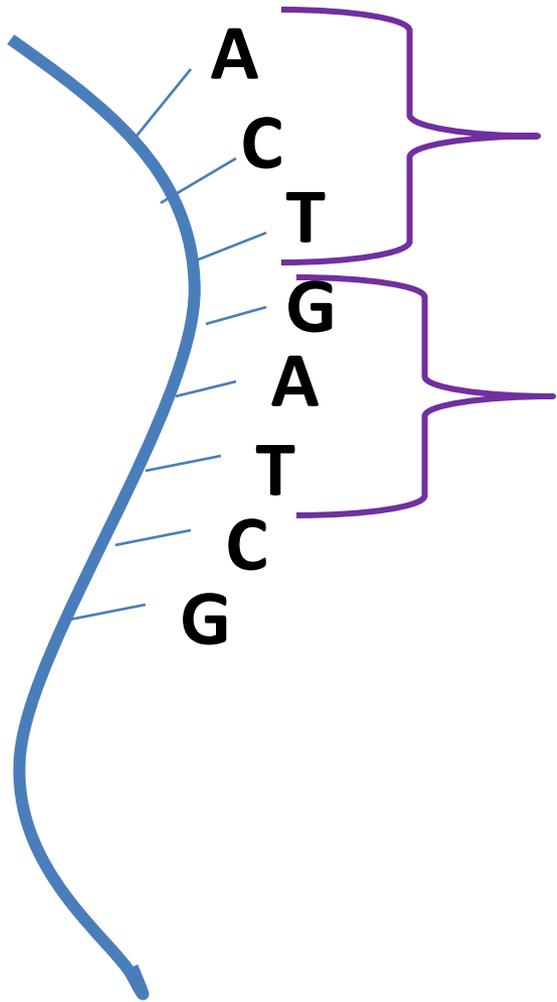
- We have four bases : A, T, C, G
- If there are approximately 20 amino acids, how many bases together in a line code for one amino acid?
  - CLUE: It can't be one because then there would be only 4 possible amino acid

Spend 5 minutes thinking about it and jotting down possibilities



Scientists established that the  
answer was ..... **3**

I.e. a sequence of 3 bases  
codes for 1 amino acid



Each sequence of  
three bases is called  
a **codon**

And the type of code is  
called a **triplet code**

Knowing what you  
now know, can you  
define a gene?

Write it down.

There are 64 combinations  
but only 20 amino acids.  
What do you think this  
means?

- Some amino acids have  
more than one codon  
sequence

3 of the sequences are called  
**stop codons**

These signal the beginning or  
end of a sequence

Others are called 'junk' or  
'nonsense' codons which do  
not code for anything

**TACGTACGTGCATGCTGCTAC**

- 1) How many amino acids does the section of DNA code for?
- 2) Two of the amino acids coded for will be the same. Which two?

# Cancer

- Cancer occurs from a change in the DNA sequence of a specific gene (a cancer gene)
- The change in the DNA sequence codes for proteins that cause the cells to keep dividing
- The cancer cells invade surrounding tissues
- The change in the DNA sequence can be caused by environmental factors such as radiation (including UV rays from the sun), smoking etc.

- 1) Explain how a change in one base along a DNA molecule may result in an enzyme becoming non-functional.
- 2) Lysozyme is an enzyme consisting of a single polypeptide chain of 129 amino acids. What is the minimum number of nucleotide bases needed to code for this enzyme? (1)
- 3) Describe the features of a gene that enable it to code for a particular protein (4)

Write down the answers

# Plenary

- State a separate sentence which includes each of the words below (try and think of more in-depth and elaborate sentences):
  - Triplet code
  - Gene
  - Polypeptide
  - Base
  - 64
  - Genome