

## **GCSE Biology A (Gateway)**

**J247/03 B1-B3 and B7 Higher (Higher Tier)**

### **Question Set 20**

1 (a)

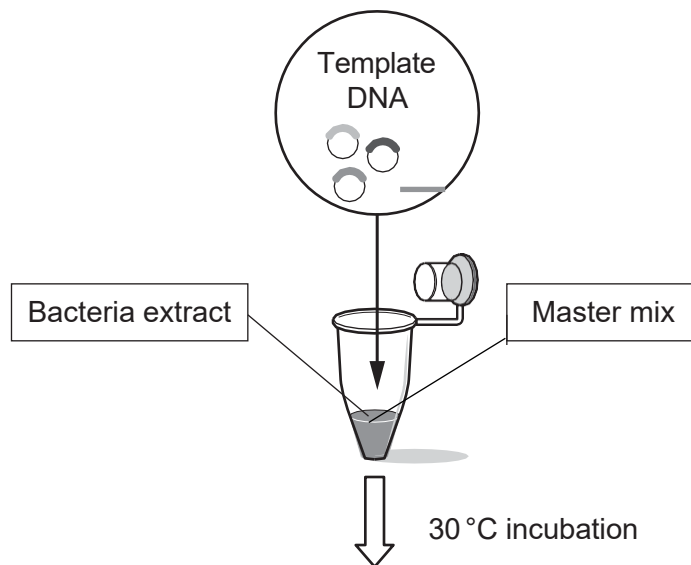
Scientists can make the proteins they need outside of living cells (*in vitro*).

To do this they use cell free protein synthesis kits.

The kit includes three different parts:

- A template DNA molecule
- An extract from bacteria containing mRNA and tRNA nucleotides
- A master mix containing amino acids, energy sources, enzymes and ribosomes.

To make a protein the three different parts are mixed together and incubated for 3 hours at 30 °C.



(i) Describe the role of the DNA template and mRNA nucleotides in the production of the protein.

[2]

(ii) Describe the role of the tRNA nucleotides and ribosomes in the production of the protein.

[2]

**(b)** Thirty years ago, identifying a person from their DNA required a large sample of DNA. Polymerase chain reaction (PCR) is a technique developed in 1983.  
PCR allows a single copy or segments of DNA to quickly make multiple copies of a DNA sequence.

**(i)** Many crimes committed over 30 years ago can now be solved using PCR.  
Explain why.

[2]

**(ii)** Which part of the cell cycle takes place in PCR?

[1]

**(c) (i)** DNA databases involve storing a person's individual DNA profile. The DNA profile identifies DNA sequences present in an individual.

DNA databases are used by many different organisations.

Solving crimes is one use of a DNA database.

Suggest **other** reasons why organisations might need a DNA database.

[2]

**(ii)** Write down **one** reason why people might **not** want to be included on a DNA database.

[1]

**Total Marks for Question Set 20: 10**

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