Transcription and translation

Student activity • observation and reasoning

YEAR 11 / LESSON 89 / BIOLOGY ONLY

The question

How can a base sequence determine an amino-acid sequence?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, pencil and ruler
- Paper DNA, mRNA, tRNA, ribosome and amino-acid model pieces

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Biology only: 3.18B. Protein synthesis.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Draw transcription in the nucleus, showing an RNA copy made using one DNA template strand.

2. Show mRNA reaching a ribosome and identify codons as groups of three mRNA bases.

3. Model tRNA carrying amino acids and matching anticodons to mRNA codons.

4. Use the supplied mini-code to translate the example mRNA 5′-AUG GCU UUU UAA-3′.

5. Explain that a stop codon ends translation and is not an amino acid carried by a stop tRNA.

6. Compare the roles of DNA, mRNA, ribosome and tRNA, and distinguish transcription from translation.

Cleanup

• Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Teaching mini-code: AUG—methionine/start; GCU—alanine; UUU—phenylalanine; UAA—stop. Example product: methionine–alanine–phenylalanine. Real proteins and processing are more complex; this is a short explanatory sequence, not a real gene.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Where does transcription occur in a eukaryotic cell?

2. What carries the copied sequence?

3. Where does translation occur?

4. What does tRNA carry?

5. Translate the example.

6. Does UAA specify an amino acid?