

6.3 Transcription and RNA Processing

Name: _____ Class: _____ Date: _____ **Total: 11 marks****KEY WORDS** introns 内含子 • exons 外显子 • transcription 转录 • messenger rna 信使

Objective

Build the skills to answer exam questions on **transcription and RNA processing**.**You must be able to:**

- describe **transcription** 转录 (DNA → mRNA) by RNA polymerase
- state the RNA processing steps (**cap**, **tail**, **splicing** 剪接)
- distinguish **introns** and **exons**

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ Transcription

Transcription copies a gene from DNA into **messenger RNA (mRNA)**. **RNA polymerase** reads the DNA template and builds an mRNA strand with complementary bases (using **U** instead of T).

■ A worked transcript

Template 3'-TACGGA-5' transcribes to mRNA 5'-AUGCCU-3'.

■ RNA processing (in eukaryotes)

Before leaving the nucleus, the mRNA is processed: a **cap** and a **poly-A tail** are added for stability, and **introns** are removed by **splicing**, joining the **exons**.

■ Introns and exons

- **Exons** — coding parts, kept in the final mRNA.
- **Introns** — non-coding parts, spliced out.

2 Practice

Now apply the methods above.

2.1 What enzyme carries out transcription? [1]

2.2 Transcribe the template 3'-TACG-5' into mRNA. [2]

2.3 What is removed during splicing? [1]

3 Exam-style questions

3.1 During RNA processing, the parts removed from the pre-mRNA are the [1]

- **A** exons
- **B** introns
- **C** caps
- **D** tails

3.2 A gene is transcribed and processed.

(a) State two modifications made to the mRNA. [2]

(b) Distinguish introns from exons. [2]

3.3 Explain why processing is needed before the mRNA leaves the nucleus. [2]

Solutions

2.1 RNA polymerase.

2.2 mRNA 5'-AUGC-3'.

2.3 Introns.

3.1 B — introns.

3.2 (a) Any two: adding a 5' cap, adding a poly-A tail, splicing out introns. (b) Exons are the coding parts kept in the mRNA; introns are non-coding parts spliced out.

3.3 Processing (cap, tail, splicing) stabilizes the mRNA and removes non-coding introns, so the mature mRNA can be exported and correctly translated.