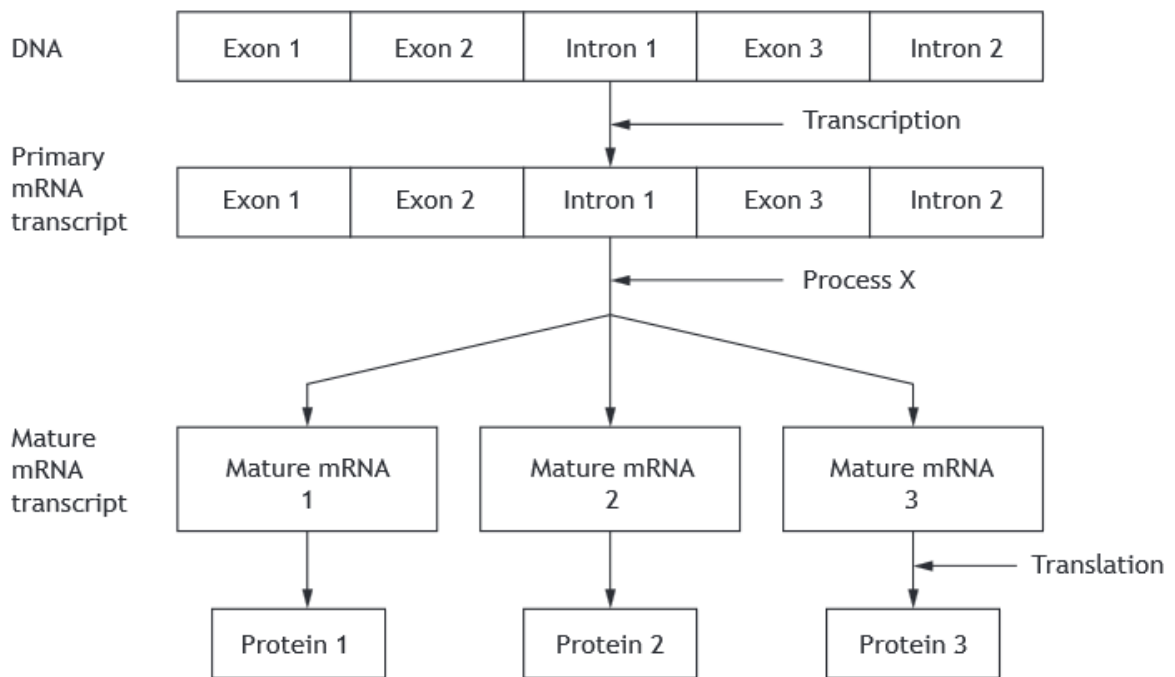


# Gene Expression

2. The main components of a ribosome are

- A mRNA and tRNA
- B rRNA and proteins
- C mRNA and proteins
- D rRNA and mRNA.

1. The diagram shows stages in the production of three different proteins that are coded for by one gene.



(a) Identify a non-coding region of DNA. 1

\_\_\_\_\_

(b) Name process X. 1

\_\_\_\_\_

(c) Explain how process X can produce different mature mRNA transcripts. 2

\_\_\_\_\_  
\_\_\_\_\_

B Write notes on RNA under the following headings.

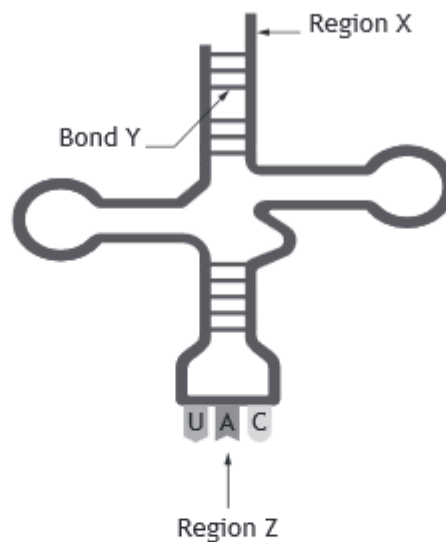
(i) Structure and functions of different types of RNA;

6

(ii) RNA splicing.

3

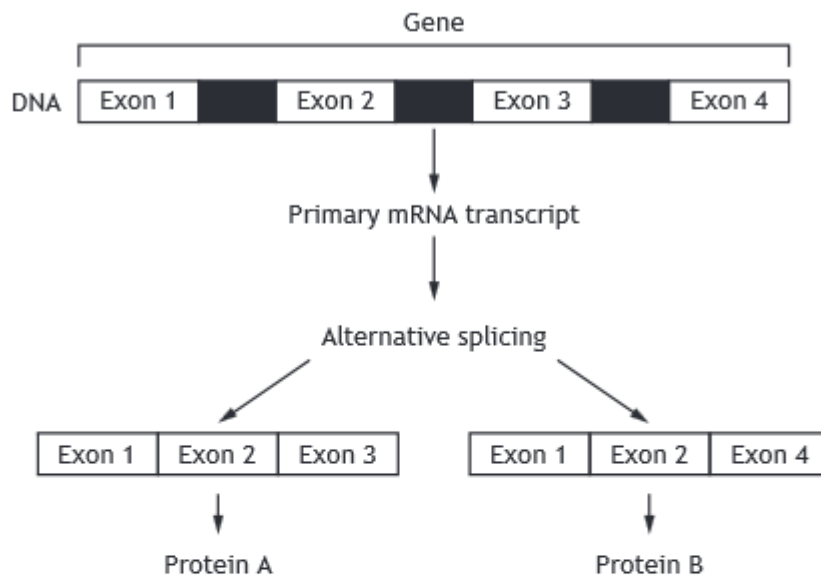
5. The diagram shows a molecule of tRNA.



Which row in the table identifies Region X, Bond Y and Region Z?

	<i>Region X</i>	<i>Bond Y</i>	<i>Region Z</i>
A	amino acid attachment site	hydrogen	anticodon
B	anticodon	hydrogen	amino acid attachment site
C	amino acid attachment site	peptide	anticodon
D	anticodon	peptide	amino acid attachment site

1. The diagram illustrates steps in the transcription and translation of a gene.



(a) Name the regions always removed from a primary mRNA transcript.

1

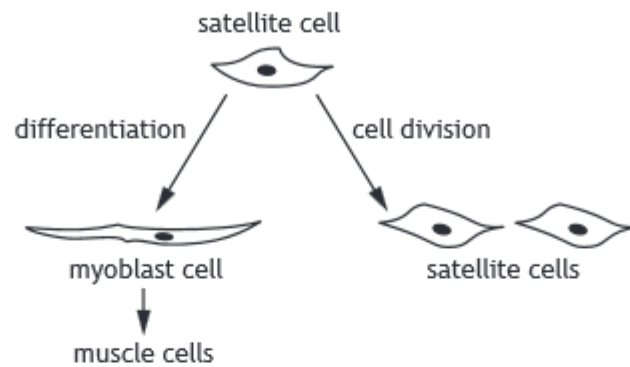
\_\_\_\_\_

(b) Insert numbers in the boxes below to show the three exons in the gene shown above which could be translated to produce a protein which is different from proteins A and B.

1

Exon ____	Exon ____	Exon ____
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4. (a) Human muscles contain satellite cells within the muscle tissue.  
The diagram illustrates the division and differentiation of satellite cells.



- (i) Using information from the diagram explain why satellite cells are an example of tissue (adult) and not embryonic stem cells. 1

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- (ii) State one benefit to the human body of satellite cells differentiating into myoblast cells. 1

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- (iii) Satellite cells could be used to treat muscle diseases.  
Give one ethical reason for using satellite cells instead of embryonic stem cells in order to treat such diseases. 1

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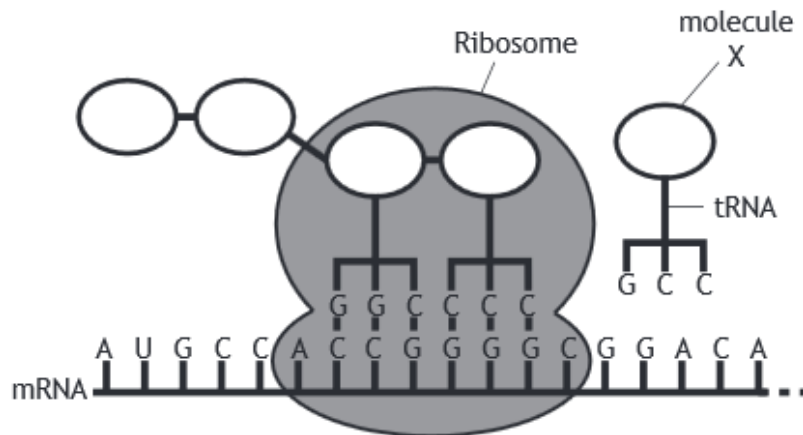
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- (b) Give one example of how stem cells are used as model cells in medical research. 1

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1. The diagram below shows a process involved in the production of a polypeptide in a cell.



- (a) Name molecule X. 1

\_\_\_\_\_

- (b) State **one** substance, other than ribosomal RNA (rRNA), that makes up the ribosome. 1

\_\_\_\_\_

- (c) Many polypeptides are modified in order to produce functional proteins. Describe **one** way in which a polypeptide could be modified. 1

\_\_\_\_\_

\_\_\_\_\_

- (d) In some eukaryotic cells, different mRNA molecules, and therefore different proteins, can be expressed from a single gene.

Name and describe the process which results in different mRNA molecules being expressed. 2

Name \_\_\_\_\_

Description \_\_\_\_\_

\_\_\_\_\_