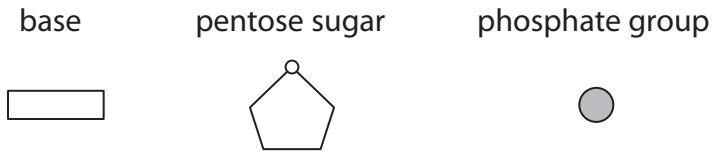


1 The polynucleotides, DNA and RNA, are involved in the process of protein synthesis.

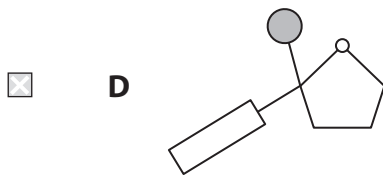
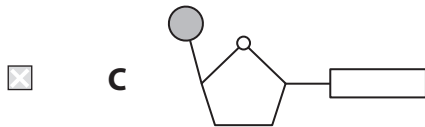
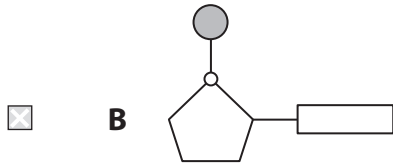
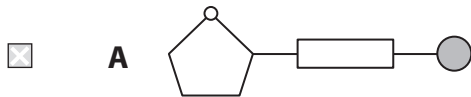
(a) For each of the statements below, put a cross ☒ in the box that corresponds to the correct statement.

(i) A mononucleotide consists of three components represented by the diagrams below.



The diagram that shows the correct arrangement of these components in a mononucleotide is

(1)



- (ii) During transcription of the section of DNA shown below, **a single base** is paired **incorrectly**.

C - T - A - A - C - T - G - C - A

This transcription error results in an mRNA molecule with the following sequence.

(1)

- A** C - A - T - T - G - A - C - G - T
- B** G - A - U - U - C - A - C - G - U
- C** G - A - U - U - G - A - C - G - U
- D** G - T - U - U - G - U - C - G - U

- (iii) The following stages occur in the production of a protein from a section of DNA:

1. the mRNA molecule leaves the nucleus
2. peptide bonds form between adjacent amino acids
3. the base sequence is transcribed
4. the tRNA anticodons pair with the mRNA codons.

The sequence of events occurs in the following order.

(1)

- A** 1      3      4      2
- B** 2      4      1      3
- C** 3      1      4      2
- D** 3      4      1      2

- (b) The diagram below shows the sequence of bases in part of a messenger RNA molecule that codes for the amino acids in a polypeptide chain.

A - U - G - G - C - C - U - C - G - A - U - A - A - C - G - G - C - C - A - C - C - A - C - C

- (i) State the maximum number of amino acids in the polypeptide chain produced from this part of the messenger RNA molecule.

(1)

- (ii) State the number of different tRNA molecules that would be used to produce the polypeptide chain from this part of the messenger RNA molecule.

(1)

(c) State **three** differences between the structure of DNA and the structure of RNA.

(3)

1.....

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2.....

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3.....

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**(Total for Question 1 = 8 marks)**

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2 One function of DNA is to act as a template for the synthesis of messenger RNA.

(a) State what is meant by the term **template** for the synthesis of messenger RNA.

(1)

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(b) Place a cross ☒ in the box to complete each of the following statements.

(i) DNA and mRNA both

(1)

- A** contain ribose
- B** contain thymine
- C** have a double helix structure
- D** have a sugar-phosphate chain

(ii) One advantage of DNA having two complementary strands is that

(1)

- A** diploid cells can inherit DNA from both parents
- B** hydrolysis of DNA is faster
- C** semi-conservative replication is possible
- D** transcription and replication can occur at the same time

(iii) Analysis of a sample of DNA found that 40% of the nucleotides contained cytosine. In the same sample of DNA the percentage of nucleotides containing adenine would be

(1)

- A** 10%
- B** 20%
- C** 40%
- D** 60%

(c) The DNA base sequence for part of a gene is shown below.

A	C	T	T		C	G	C	C	C	G	A
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Write the mRNA base sequence produced from this sequence of bases.

(2)

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(d) Describe **three** differences between the processes of replication and transcription of DNA.

(3)

1 .....

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2 .....

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3 .....

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**(Total for Question 2 = 9 marks)**

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