Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) 1. Hydrogen bonds (between DNA bases) break;
Ignore DNA helicase.
Reject hydrolysing hydrogen bonds.

2. (Only) one DNA strand acts as a template;

3. (Free) RNA nucleotides align by complementary base pairing;
For 'align by complementary base pairing', accept 'align to complementary bases' or 'align by base pairing'.

4. (In RNA) Uracil base pairs with adenine (on DNA)

OR

(In RNA) Uracil is used in place of thymine;
Do not credit use of letters alone for bases.

5. RNA polymerase joins (adjacent RNA) nucleotides;
Reject suggestions that RNA polymerase forms hydrogen bonds or joins complementary bases.

6. (By) phosphodiester bonds (between adjacent nucleotides);

7. Pre-mRNA is spliced (to form mRNA)

OR

Introns are removed (to form mRNA);

5 max

(b) 1. (mRNA attaches) to ribosomes

OR

(mRNA attaches) to rough endoplasmic reticulum;

2. (tRNA) anticodons (bind to) complementary (mRNA) codons;

3. tRNA brings a specific amino acid;

4. Amino acids join by peptide bonds;

5. (Amino acids join together) with the use of ATP;

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6. tRNA released (after amino acid joined to polypeptide);

7. The ribosome moves along the mRNA to form the polypeptide;

6 max

(c) (Definition of gene mutation)

1. Change in the base/nucleotide (sequence of chromosomes/DNA);

   For 4 marks at least one mark must be scored in each section of the answer.

   Accept named mutation for 'change'.

2. Results in the formation of new allele;

   (Has no effect because)

3. Genetic code is degenerate (so amino acid sequence may not change);

   OR

   Mutation is in an intron (so amino acid sequence may not change);

   Accept description of 'degenerate', eg some amino acids have more than one triplet/codon.

4. Does change amino acid but no effect on tertiary structure;

5. (New allele) is recessive so does not influence phenotype;

   (Has positive effect because)

6. Results in change in polypeptide that positively changes the properties (of the protein)

   OR

   Results in change in polypeptide that positively changes a named protein;

   For 'polypeptide' accept 'amino acid sequence' or 'protein'.

7. May result in increased reproductive success

   OR

   May result in increased survival (chances);

4 max

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Q2.

(a) Substitution;

Accept inversion or translocation

Ignore 'point mutation'

1

(b)

Max 2 marks for mark points 2, 3 and 4

1. ($VO_{2\,max}$ **and** CS activity) increased for both groups;

2. No statistical test, **so** do not know if **differences** are significant
OR
No statistical test, **so differences** could be due to chance;

Ignore standard deviation

Accept correct named statistical test eg t-test

3. Only 8 weeks training
OR
Training did not last long;

4. Might not be true for all types of training/exercise/females;

3 max

(c) In Group **C**:

1. Less mitochondrial replication/production;

*1. and 2. Accept converse for Group **T***

2. Less transcription (of genes) for mitochondrial proteins/CS
OR
Less translation of (mRNA into) mitochondrial proteins;

Accept less CS/enzyme is produced

2

(d)

Max 2 marks for mark points 3, 4 and 5

Ignore any answers relating to sample size or duration of investigation

Ignore 'correlation does not mean causation' unless qualified

For (no mark)

1. (From **Figure 2** Group **T** have) increased CS activity for Krebs cycle;

2. (from **Figure 1** Group **T** have) increased $VO_{2\,max}$ **so** more oxygen (available)
OR
(from **Figure 1** Group **T** have) increased $VO_{2\,max}$ **so** more aerobic respiration
OR
(from **Figure 1** Group **T** have) increased $VO_{2\,max}$ **so** delayed anaerobic respiration;

Accept 'less lactate' for delayed anaerobic respiration

Against (no mark)

3. No correlation between (percentage change in) $VO_{2\,max}$ and CS activity
OR
No correlation on **Figure 3**;

4. It might not be thymine causing the increase

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OR

There may be other differences in the control region (of Group **T**) that cause the increase;

Ignore 'could be due to lifestyle/diet changes'

5. $VO_{2\ max}$/CS activity not the only measures of ability to exercise for longer;

Accept ideas that they did not measure ability to exercise for longer

3 max

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